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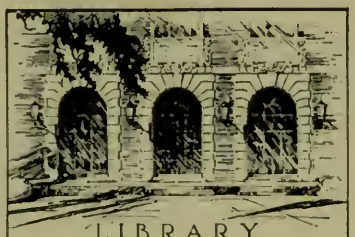

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TRANSACTIONS

OF THE

Illinois State Dental Society

AT THE

THIRTY-FOURTH ANNUAL MEETING,

HELD AT

SPRINGFIELD, MAY 10 TO 13, 1898.

PUBLICATION COMMITTEE:

A. H. PECK, E. NOYES, C. N. JOHNSON.

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THE ANNUAL ADDRESS OF THE SOCIETY BY THE PRESIDENT.

Dr. J. A. W. Davis, Galesburg, Ill.

Members of the Illinois State Dental Society: Time in its never ceasing flight has brought us to another annual meeting of the Illinois State Dental Society. With the year just closed the Illinois State Dental Society has been fulfilling its mission for just one third of a century. Who can fully estimate the great work in all its varied departments in the elevation and scientific development of the profession in this third of a century? That its work in every way has been very creditable and commendable, I think all who are conversant with its history will readily admit. That it has accomplished all that can be realized for the benefit of the profession of the State at large, no one I think will claim.

In last year's annual address, Dr. Taylor expressed the opinion that the State society was showing signs of indifference or inactivity in the last few years in the line of professional progress. I hardly think the facts will bear out this conclusion. Our transactions have been published right along, and if any one will compare the work of the society in its earlier years with that of the latter, I think it will be found that its work in all departments has been equally as progressive and elevating as any work in its history. The Illinois State Dental Society in every department of its work, from its organization down to the present time will bear a very favorable comparison with any State society in this country. Some have gone so far as to assert that it is the peer of any society in existence.

At no time in the past history of the world has there been so much time, labor and energy devoted to the formation and development of societies for the mutual aid and development of every department of science as at the present.

There are three leading elements that have been mainly instrumental in the unsurpassed progress and development of our profession. They are the dental journals, the dental colleges and the dental societies. But of the two former we do not now propose to speak. And as much as we are indebted to our colleges and journals for what they have done for the profession, all will, I think, agree that to the various societies scattered all over this land should the honor be given of exerting a very marked and direct influence in the enhancement and development of dental science.

In order that we may more clearly see what has been done in this direction let us go back to the time when there were no dental societies in existence.

Prior to 1840 there was but little fellowship, public or private, between dental practitioners; and every acquisition was hoarded up for private use, and the secrets of the laboratory and operating room were never exhibited to a fellow practitioner for any consideration whatever. Is it any wonder that under this supreme state of illiberal bigotry no material progress should have been made in all the years that preceded the organization of the first American dental society in 1840? This society exerted a great influence in dispelling that system of selfish exclusiveness which denied to others the benefits of individual experiment; and in time, though by slow degrees, this exclusiveness became a reproach. From the organization of this society dates the dawning of that spirit of liberality and social fellowship which now pervades the profession and which more than all else has made it what it is—useful, honorable, dignified, progressive, learned and humane.

From that time down to the present societies have multiplied until there is ample opportunity for membership in one or more for every worthy practitioner in the profession. What are the immediate and direct benefits to each member of the profession who is an habitual attendant of one or more dental societies? Whatever general effect is produced by these societies upon the profession at large they of course have the same effect upon each individual member who avails himself of the privileges and benefits to be derived therefrom.

The object of dental societies is to increase professional knowledge, both theoretical and practical, to bring together all worthy operators so that they may know each other better and thus be better prepared to forbear with one another and to act in

closer accord and harmony in the elevation of our profession. Every practitioner owes a two-fold duty, a duty to himself and a duty to the profession at large. It is every dentist's first duty to improve, to educate and elevate himself, helping forward his brother practitioners at the same time by all reasonable methods. Each one has within himself the capability and free action to a large extent; and the fact is proved by a large number of the eminent men in our profession who have successfully battled with and overcome the adverse circumstances of early life and have reached the positions they now occupy by dint of the energy and inherent resolution of purpose that has ever marked their career in the advancement of the profession. Is it not a fact that the achievements of these men in our profession are the results of great trials and difficulties that they have encountered and overcome?

Let every dentist in our State resolve that he will do his full duty to himself and to this society and the first step is already made. This resolution is half the battle. This is giving to others the most eloquent of all lessons, that of example, which teaches far more emphatically than words can teach. By thus doing our duty we incite others by imitation to perform their duty and if the majority of our practitioners will only in this way act how much wiser, how much more efficient and reliable as a whole would the entire profession of the State become.

Having briefly adverted to some of the work done by our societies for the profession at large and to all who have availed themselves of their benefits individually, it now remains for us to see at least some of the things yet to be accomplished by them. In order that our societies may become more fruitful, more elevating and progressive with the entire profession as well as the individual members, we must induce every worthy operator in the profession to become a member of one or more of our dental societies. Of the 1,800 or 2,000 dentists practicing in the State, we have only been able so far to secure for this society a membership of 269 at this time, including all classes of members, nonresident, corresponding and honorary members. We ought to have, and I believe we can raise our membership to 600 or 700 by making the proper efforts. From the replies Dr. Allen received last year to the questions sent out I am convinced that many do not have a correct knowledge of the scope and real objects of our dental societies. Many perhaps think they cannot afford to attend. To

such I would reply that did they know their true value they would readily come to the conclusion that they could not afford to stay away. Others stay away from a general indifference and the want of a proper knowledge of the societies. Still another very large class stay away because they are already so wise in their own estimation that no society can teach them anything more. What a happy consummation. How they must look down with ineffable disdain from their proud and lofty position to view us less favored mortals who are constantly toiling onward and upward but still see that much desired state, perfection, far in the distance. To this class of dentists we would suggest that if they have really reached perfection in our profession they are the very ones above all others who should attend our societies and impart to their less favored brethren some of their preëminent skill and knowledge. There are some who seem to think that they are not wanted in the State society because they never received an invitation to become a member. It is probable that we have been remiss in our duty to some in this respect. If so let us in the future permit no one to give this as a pretext for not becoming a member of this society.

We do not claim that dental societies can readily transform every poor and indifferent operator into a paragon of perfection, but we do claim that they will make of every honest seeker of truth and progress a better dentist in every sense of the word than he can be without them. Nor do I deny that there may be good operators that do not attend societies, but I think I may safely say without fear of contradiction that if they are good operators without the aid of a society they would be much better operators by placing themselves under a society's influence. If the professors in our colleges, the editors of our journals and all of the most eminent members of our profession consider these societies so essential to them in this day of rapid progress, what shall we say of their crowning necessity to the wants of the great masses of the profession who have not as yet been brought to a position where they can see and fully appreciate the benefits to be derived from them?

Then let each member of this society individually endeavor to bring within our fold every worthy dentist in our State, and to this end let us organize a local society in every city and locality where there are practitioners enough to make it practical.

Great interest has always been manifested in the clinical

department of our State society, and the two recent meetings of two local societies—the Chicago Dental Society and the tenth anniversary meeting of the Odontographic Society of Chicago—very fully demonstrates the widespread interest felt in the clinical part of dental society work. Therefore I would suggest that next year's meeting be made an anniversary meeting and that it may be largely devoted to clinics, and that this meeting be held in Chicago where the college buildings will afford ample facilities for clinical purposes. Doubtless such a meeting would give great impetus to our society and add greatly to its membership.

The Dental Protective Association has done a grand work for the dental profession in freeing it from the clutches of patent sharks and certainly deserves the united and earnest support of every dental society in the country. This society should give it every aid and encouragement within its power and its members should individually strive in every possible way to augment its membership. It has not received the support from the profession at large that it justly deserves; many seeming to be willing to receive its protection but unwilling to render it any financial aid, allowing others to pay for what they have received in the way of protection. For the further advancement of the profession it needs men, true men of energy and unfailing industry and perseverance, men who will honor and if need be make personal sacrifices for its advancement and elevation, men who are willing to make researches in the interest of the profession; in short, men of noble nature and high aspirations, pure in morals, courteous in demeanor and of high intellectual culture.

Could our profession be composed of such men and such only how soon would it attain that exalted position among the learned professions that it should occupy. In the love then we bear our profession, by the hallowed memories of those earnest workers who have passed, by the interest of the living present and the great needs of an unborn future, let us ever keep working and the tiny seed will grow into the sapling and the sapling into the tree and under its shadowy foliage we may end our years with the consciousness that we have not wholly lived in vain. (Applause.)

DISCUSSION.

Dr. C. N. Johnson, of Chicago: I do not want this to start out as a Quaker meeting and I hope every moment of the time will be occupied.

I was very much pleased with the address of the president, and there are two or three points that I should like to touch on. I agree with his remarks relating to the benefits obtained in attending dental societies, and I can truthfully say that I have been amply repaid already for the time and expense incurred in coming to this society. I have been repaid in the friendly handgrasp of my fellow practitioners. I am repaid in the fellowship that comes to me as the result of these meetings. I do not believe it is possible for any man to estimate the full value and benefit to be derived from these meetings without attending them. There is another thing, the president in his address spoke of there being a twofold duty that the practitioner has to perform, one to himself and the other to the profession at large, and that is true. Those are both important duties, but I would go one step farther than that. I believe that the greatest duty we owe has not been mentioned, and the more I live in the profession the more I am impressed with this one thing, that our fundamental duty as dentists is the one we owe to the public at large. We do not meet here alone for the personal benefit that we may gain by it; we do not meet here simply for the benefit of the profession; we are meeting here for the benefit of humanity, and when we consider that every man who attends one of these meetings and gains some new points in science, and goes out into the world and meets his patients so much better equipped to treat them intelligently, I think then we have come down to the gist of what these meetings really mean, and I hope we will all keep that aim in mind.

Dr. Edmund Noyes, of Chicago: I want to make an amendment to what Dr. Johnson has said and add to it a little. The statement he has made is pretty broad. He says our first duty is to humanity. I would say that the first duty of a professional man is to his patrons; to serve them is the business of his life. That is what we live for, or what we should live for. It is our every day work, and the duty which takes our thought, our time and our strength from hour to hour and week to week. It should be the first duty and is of the greatest importance. Second to that, (I would not put them quite in the order that has been done) second to that a man's duty is to his profession, and this is closely related to the other and is only an enlargement of it. Every help and value which a man can contribute to his profession is a contribution to a larger number of patrons, those who are depend-

ent upon the profession for service. Last instead of first is a man's duty to himself, and this with reference to preserving his power, increasing his ability, his strength, his efficiency of service for his profession, for his patrons, for the community in which he lives and for the great world of humanity. That is the way it seems to me this matter should stand in the minds of right thinking men. There is one other thing referred to in the address which we always hear and which I sometimes think may possibly be just a little overworked. I mean the statement that prior to about forty years ago there was practically no fellowship among dentists, and a spirit of selfish exclusiveness with respect to every man's particular knowledge and skill, and this is always attributed to a desire to retain personal possession of individual or exclusive knowledge or methods of practice. It seems to me that it is hardly fair for us to assume that human nature is so very different now to what it was then, and I believe a good part of this secretiveness may just as reasonably be explained on the ground of diffidence and want of knowledge of what other people are doing, as on the ground of selfish rivalry. Men who do not know what other men do are sometimes timid about making public their own performances. If you can get them together and get them started they may find that they have something to give and that other men have something which they can receive, and they begin to feel that the foundation under their feet is more secure, and they become less diffident about giving themselves away and more free in exchange of ideas. The communication in societies is, and has been for a long time, almost the only way in which this secretiveness can be broken down, and it is undoubtedly one of the most important uses which the societies have served. The value of it can scarcely be appreciated by young men who have been educated in college communities and have no idea of the isolation and exclusiveness that was in the lives of men who were trained in offices in contact with single preceptors. And so the societies and colleges have both been strong factors in breaking down this spirit of diffident exclusiveness that undoubtedly did characterize the profession forty or fifty years ago.

Dr. Garrett Newkirk, of Chicago: I thought that was a most excellent address, full of suggestions, and I think that the president and both the gentlemen who have spoken are substantially agreed. The president, in speaking of the first motive, or the

important part of the education as being related to one's self, intended to make that broad enough to include the two points mentioned by Dr. Noyes. Now I wish to emphasize again this one thing which I have been harping on for many years, the importance of local societies everywhere in the State, and the importance of every young man attaching himself to one or more of them. There is not anything which will do a young man so much good as to unite with the society which has a local habitation in his city, or associated cities (as at Rock Island, Moline and Davenport on the Mississippi), or in the district where he lives. There is in such societies a good fellowship; a lack of that restraint which young men are apt to feel in the presence of those older in the profession. The local society is the place for the young man to get a start, and then afterward he will probably want the State society. There ought to be more of these local societies than there are, and those we have should be more thoroughly sustained and encouraged by those immediately interested. If there is any young man here who does not belong to his local society, I want to urge upon him to go to the first meeting and join it, and take part in the proceedings.

There was one recommendation which was made in the address that I am doubtful about, and that is in regard to meeting in Chicago and having a great clinical meeting. Now, we have several alumni associations there who take up this clinical business, one or more of them every year, and they do it up pretty thoroughly. I am inclined to think that the office of the State society is just a little outside of that, and that we had better meet some other place than in Chicago. I think we would have a better meeting at Rockford, Peoria, Quincy or Ottawa. It is such a rest for us Chicago men to get out from under the everlasting cloud of smoke that obscures the whole sky and makes the horizon absolutely invisible; such a relief to get out and see God's blue sky, and the green fields, the orchards in bloom, and to hear the birds sing once in a while. Oh, do not make us meet in Chicago, please.

Dr. J. W. Cormany, of Mt. Carroll: I was just about to call Dr. Newkirk down because he was getting just a little bit on my subject. But I want to call the attention of the members, and those here who are not members, to the practical side of being a member of the Illinois State Dental Society. I paid my dues this morning for the twentieth time. The least that I ever paid in

attending a State meeting was $25, and the most that it ever cost me was $50. But I was going to say that the more societies I go to in the course of the year and the more that it costs me to get there and get back, the more money I make that year. Now that it is an absolute fact, I know it. And it just seems that my community say to me: "Here's a man that goes to the State meetings, he goes to his district meetings and he takes part in those meetings; surely he must come home and know more than he did when he went." And I do, and I hope to continue to attend them so long as I live.

Dr. T. W. Brophy, of Chicago: I was very highly pleased with the address of the president because of its great breadth. In the preparation of his address the president kept in mind the fact that our usefulness is not limited by any means to ourselves or to our patients. The greatest usefulness of the professional man is in the dispensation of knowledge. Every man is a teacher. Those who come under his instruction may not be many, but he teaches some of them. We teach one another, and if we were not to do so we would not be fulfilling our duty. There is no practitioner, no matter where he may be located, who is unable to teach some fellow practitioner some special thing. And the greatest usefulness of a professional man is in the capacity of a teacher. If he be connected with a college and has the education of pupils in his hands, his responsibility is great indeed. The greatest duty of a professional man is to the public. I have made this statement a number of times, and I will repeat it, that a large majority of the people are uninformed as to dentistry and as to its usefulness, as to its importance to them, and so our greatest mission is to teach the people, and this we should do whenever it is possible to do so. We come here, we teach one another, and the young man who fails to come makes a mistake. I congratulate the society on having listened to so able an address. It gives us something more to think about. I met a young man in the elevator yesterday in the building in which I am located, and I said to him: "Are you going to the State Society meeting?" "What meeting?" said he, "why, I didn't know anything about it." "Why," I said, "don't you know we have a State society?" "I supposed you were going." "No," he said, "I can't get away." I said, "Young man, you will find after you have been in practice about ten years that you will be unable to stay at home during these meetings providing

you catch the proper spirit. You cannot afford to stay at home; you cannot afford to miss the great flood of instruction that will be given at these meetings; there is always at every meeting many valuable papers read."

As to the place of our next meeting, I always delight in the beautiful expressions of Dr. Newkirk, who has been so gifted in his utterances in poetry and in song, but I do not agree with him. I believe if the mission of this society is to teach—and I certainly believe that is its mission, it has shown that by its existence—and therefore, I believe that at this time it cannot do better than to go to Chicago to hold its next meeting. It is said that there are nearly one thousand dentists in Chicago. Out of that number a very small percentage come to these meetings, and if this society goes to Chicago and gives out that there is to be a meeting of this kind, there will be the largest meeting that ever convened in the State of Illinois. I think we will get 150 new members in Chicago, and if we get 150 new members, providing not over twenty-five per cent of that number remain in the society, we will do a great work. I think our society increased last year about fifty members, and I believe that seventy-five per cent of them will stay in the society. We will do the profession more good, gentlemen, by going to Chicago, I think, next year, than by meeting any other place. The judgment of the society may not lead us there, but if we go I think it will be a wise step.

Dr. E. K. Blair, of Waverly: The line of thought that seems to be uppermost in the minds of the members of the society who have just spoken, is that there is a great degree of diffidence on the part of some of our very best men in the State. Something ought to be done, if it is possible, to lift them up out of that position. Some of our best men are timid, or backward, or whatever word you choose to use. They are backward about coming before the society as clinicians. I do not offer this in a critical way; I simply say it is a condition that exists; I have found out to my satisfaction that it is not a theory. Now, for a long time the society has made a strenuous effort to increase its membership from members of the profession throughout the State. I believe that the society ought to grow, and yet, the thought is gaining a foothold in my mind that continually urging people to join our society, may be keeping some of them out. I note that organizations that have a key turned in their door, and a password, have

to have a guard with a gun to keep people out. If there is something just a little bit mysterious the applications come in just as fast as you want them, but if you throw the doors wide open and extend the right hand of fellowship before it is extended to you, the thought is that it is a little bit common. I agree with Dr. Cormany in what he has said in regard to the practical side of the question; and as to the expense account that I have made in coming here, it has never cost me $50, but I have received a sufficient amount of benefit from this society to enable me to realize in a very short time after going home that I was ahead financially. I wish to have you think about the matter a little, as to whether we ought to urge these fellows quite so much. I know there are two or three thousand dentists in the State, and they ought all to belong to a society, and I lose a little bit of patience with some of them who stay outside. It is a good thing and they ought to know it. They ought to see it is a good thing and take hold of it.

Dr. E. H. Allen, of Freeport: I was asked a day or so ago if I was going to attend the meeting of this society. My reply was that there were only two things that could possibly keep me away, one was sickness and the other death. I told the individual that I could not afford to stay away from this meeting. The president in his address has very happily stated the subject, and he speaks of the work of the society as being educational. Some one in the replies that I got last year in gathering the material for my paper called this society a post-graduate school. Now, it is. Then, to go a little farther, one of the aims of this society is to show a missionary spirit. I tell you I do not believe anybody in this society understands the value and the necessity of a missionary work better than I do. I regret to say that I am the only one here from Freeport. I have tried to get others to come. To show you how some feel about it, one stated in a cringing sort of a way that no, he couldn't go this year, he was fixing up his office. He has been doing this for two months. Another one would like to come, but he thought that $5 a year was a pretty big fee, and he had to pay $5 every year in order to keep his membership, but if he could come here when he felt so disposed and pay while he was here and still retain his membership, he would be very glad to come. Now, the work is to eradicate that spirit and that feeling. I do not believe, however, (I may be pessimistic in my views) that

we can get a society of 600 members in this State. I at one time did think so, but I do not believe it now, because, as I said before, of the incompatability of temperaments and characters. I think that human nature in the dental profession is just the same as it is anywhere else. There are people who never affiliate with any society; and yet, not alone in the dental profession, but in all other professions, there seems to be a tendency among the people to organize societies and carry on society work. We have our labor organizations; we have our fraternal and educational organizations. But, on the other hand, I think that the dental profession is away ahead of the medical in regard to society work. I have no statistics to carry out that statement, but I simply make it from observations that I have made in my personal acquaintance with medical fraternities. Now, there are possibly in Freeport only one or two physicians that attend any medical society, and the rest of of them all stay at home; they think they cannot go. I also have observed that the representative men of any profession are engaged in society work. I wish I knew of some plan to work up this matter, but I confess that I don't know any better how to get at this work and create an interest among the outsiders in society work than I did three years ago.

The suggestion of meeting in Chicago next year I think a good one. The idea that if we get the country people up to Chicago they will all attend the theaters and other places of amusement, and that we won't have any meeting I think has been entirely refuted by the clinics of the Chicago dental societies and by those given in St. Louis, and if there is any need of missionary work anywhere in this State it is in Chicago.

Dr. Grafton Munroe, of Springfield: I was pleased with the president's address, especially that part of it which referred to education. Our president's address of last year sent me home imbued with the idea to do what I could to start a local society. And several of us got together to think of some way to get that society started, and we started out on the round robin style so that no one would receive more credit than the other. It worked beautifully, and in regard to missionary spirit, I think Dr. Allen would find that just the finest sort of way to start the missionary spirit in connection with the State society, is by getting his own community started on a local society. It pertains to dental work as well as to general work, and if we can get up local societies and

get them to going we will get the men interested in dental work and in dental talk and in topics that pertain to dentistry, and in that way we will get the missionary spirit worked toward the State society. Our local society has met the second month. We have no very formal organization, although we have been working over two months on constitution and by-laws. At the last meeting we passed around a hat with questions in it. We were at a loss to know just what to do, and we appointed a committee and they decided on this plan, and we got a whole hatfull of questions. At our first meeting we had fifteen dentists present; that was a starter. They had signed that petition and they thought that they must go after signing it, although some of them did not come who did sign it. But we did not let anybody escape; we went even to the advertising men in our city here and asked them to join. We wanted to get together in friendly intercourse and do away with the hostile feeling that so often keeps dentists apart. After that meeting our second meeting was called with the program announced and we had quite an interesting meeting. They all took part, that was the important matter, and I expect our third meeting will be even better than our second.

In regard to the way in which a dentist can educate a community, I found that when I attended the Odontographic meeting in Chicago most of my patients knew that I had been away. When I came back I would speak to my patients about little things that I happened to catch at that meeting. I would say, "Now this is something that I got at my convention." They saw that I had my eyes open while I was away. I think that anybody that does not enjoy a dental meeting for their own benefit, as well as for what they can get for their patients, must be a queer sort of a fellow. To-day in this State building a gentleman said to me: "What are you meeting for?" I said, "We are meeting for the people's sake." "Oh yes" he said, "is that so. Don't the people have to pay you?" I said, "No, we are paying the expenses." "Oh," he said, "but don't the people pay you for fixing their teeth?" I said, "Yes, but we learn better how to do it."

Dr. G. H. Henderson, of Springfield: There has been considerable said about how much we can do and what we ought to do. Two years ago I joined this society; it has amply repaid me. All along in Springfield it has been told me and others that it was utterly impossible to form a local society. I did not believe

it then and I do not believe it now. If you want to get members into a local society, get after them, and show those who are around you that you are willing to talk to them. Our Springfield dentists I believe to a great extent have gotten over the idea that the others were down on them; that the others were rivals. There are no rivals; there is room for us all. There is a place for all of us if we can succeed in finding that place, and by joining societies and helping along in that way we will find our place and be better fitted to work for our patients. If any of you have not a local society, get one, and if you want one go out after it.

Dr. J. G. Reid, of Chicago: I want to say a word with reference to what Dr. Allen has said. One thing rather surprised me a little, and that was, he did not think it was possible for the Illinois State Dental Society to increase its membership to 600. The gentleman who just sat down has very aptly hit one of the keynotes in the success of a dental society. If we expect to have a society we must work for it, and that rests with the members of the society. If every member of this society has the society at heart, and its interests and its future, he should work for it. Now, there are about 265 members in this society. There are about 25 out of the 265 that make an effort to increase its membership. Now, there is a lack of interest, individually, in approaching and soliciting your neighbor to join the society. I believe that if this method is followed rigidly and in the right way, this society would have a membership of 600 without any trouble.

Dr. Geo. D. Sitherwood, of Bloomington: I only heard the latter part of the president's address, but I am glad to hear this talk. I was interested in Dr. Allen's remarks. We tried to start a local society in Bloomington recently, and I believe we will have one yet, in regard to all this talk about the increase of membership, I believe that we will increase the membership. There is no doubt about it, because dentistry is growing as a profession, and it is becoming better known in the world. You all are aware that dentistry is yet divided into two classes—the mechanic who remains at home, and the professional man who attends the State society meetings and the meetings of the other societies. A great bulk of the public at large do not know of this and have not yet learned to distinguish between a mere mechanic who fills teeth and a professional dentist who treats teeth successfully. While it would be pleasant to us, and a great deal better for the

world if we had a much larger attendance, yet, the world is benefited because of the attendance we have in this society. When I look around me and see the faces of members of the dental profession of the State of Illinois who make dentistry what it is, who are the leaders, the teachers, the educators in dentistry, and while comparatively few meet here, yet, the others get the benefit, just as it has been in the Dental Protective Association; a few paid the money, the others got the benefit. So I am not discouraged with reference to our work as to what we gain and what goes forth, because our numbers are not so large as we would like, our influence is great and the public is lifted up and benefited, and we mould and make the sentiment or whatever you may call it. One point I wish to speak about is that which keeps many men out of the State society. I have made considerable effort to get more into the dental societies. The code of ethics which we have being on a high plane as in all good societies, keeps out a large number of men. They say they cannot live up to them so they stay out, and it is better for them and better for the society that they do stay out. Yet, at the same time, I am in favor of this missionary spirit. Each one do all they can, and if each one will do their best, we will increase the membership of the society.

Dr. J. G. Reid, of Chicago: There was one other point that I forgot to speak about, and that was the education of students. I believe we should start our work in our institutions of learning; educate the student to associate himself with professional gentlemen and in a professional way, and if he is started on that track he has some guide to go by and will generally follow it.

Dr. Shryock, of Fort Wayne, Ind.: I have had the pleasure of attending the meetings of this society every other year for the past ten years, and I have never attended any society I have enjoyed more or that has done me more good.

A great many who are not members of our societies claim that it is the code of ethics that keeps them out—I have had experience for twelve years in our own State society and have tried to bring in other men—their general excuse is that they are opposed to the code of ethics, but I am inclined to think that they do not wish to display their ignorance. A man who is a man, whether he is in the ministry, law, medicine or any of the learned professions, does not need any code of ethics. In the first place, no

code of ethics will ever make him professional; that is the stumbling-block, and the gentleman who just spoke with reference to the difference between the professional man and the mechanic certainly explains it to a nicety.

Another point: I believe that for the past forty years we have been having dental societies, and as I said before, I always look upon the Illinois State Dental Society as being one of the best in the land. It seems a little queer that the capital of this magnificent and progressive State has just started a local society. About three years ago the Isaac Knapp Dental Coterie, of Fort Wayne, Ind., issued what is known as the Dental Instructor. I corresponded with Dr. Munroe, asking if he could use any in his practice for the good of the public, but he wished Illinois to have the credit of originating all good things. In the end, however, he gave me an order and I hope was pleased. This is why it seems queer to me that he should have been so slow in starting a local society.

At home we had a society thirty years ago, and have had with the exception of a few years. The Coterie passed its seventh anniversary January 20, last.

With reference to our dental colleges teaching ethics, there is a young man from a Chicago college now in a dentist's office in Fort Wayne. He called the other evening, and in the conversation I asked what was taught in the college with regard to the code of ethics. "Why," said he, "it is never spoken of." He just laughed and said, "Why should the professors want to teach us the meaning of the code of ethics, when the colleges advertise as they do in the city papers?"

Dr. T. W. Pritchett, of White Hall: I do not have much fear for the future of this society. We all know that it is very good or we would not be here. I do not know that I am in such hearty accord with the idea of building it up so exceedingly large. If a large body, six or seven hundred dentists, were to meet together I can hardly imagine what sort of a meeting it would be. It would have to be planned on very different lines from those on which we now conduct it. I think it is certainly true that every man who is worthy to become a member of this society ought to know that he has a welcome here if he will come and take it. And I am not spending a great deal of time in this missionary business. Every one that I meet I talk to about it, but I do not go out of my way great distances to hunt them up. Every man should know—he

does know—about the terms on which he can ally himself with our societies, local and State, and I am very well satisfied with the conditions of our society as they exist. We had a fine addition last year, and I have no reason, so far as I know, to doubt that we may not have a larger addition this year.

Dr. P. J. Kester, of Chicago: I do not know that I can add much of interest on this subject. It is one, however, in which I am much interested.

Having been associated more or less in college work for years, what has impressed me most is the spirit of commercialism that seems to be developing in the profession. Gentlemen attend dental meetings, and contend that it is a profitable investment, meaning that they are able by some means to transform their attendance here into profit at home. This is an age of commercialism and it pervades the dental profession in their ordinary practice, and many times in their experimental work. I think I can illustrate in my own case the difference between the truly scientific and the imitation man of science. Every experiment that I make, the idea of the cost enters my mind. The true scientist does not consider that. I have occasionally been associated with a truly scientific man, and he has no regard for the cost of things, and only considers the benefits that may result.

True professionalism should be taught in our schools, something akin to the fraternalism taught in some of our social orders, which advises you to defend a brother if the chances of saving his life are greater than those of losing your own. To benefit your patients regardless of whether you shall be repaid in dollars or not, you may serve or not; but if you do then it becomes your professional duty to do the very best thing, even though you may know that your patient cannot afford to pay a proper fee. That is none of your business; that is simply unfortunate.

Dr. L. W. Skidmore, of Moline: I have been very much pleased with our president's address, and I am glad that he has brought out so prominently this feature of benefiting our profession by associating ourselves together. I presume many think that they can gain what knowledge is necessary from reading our proceedings in the dental journals, but they certainly cannot get the benefit from it that they can by coming, listening to and seeing the men who take part. I am glad also that he spoke of the Den-

tal Protective Association. I do not believe that any man should get the benefits of the association without helping to pay the costs.

Dr. J. N. Crouse, of Chicago: There is one important question which should never be lost sight of—what constitutes the dental profession? It certainly is not limited to the Illinois State Dental Society, nor to all the men of the various societies, which would constitute probably four or five thousand out of the many thousands in the profession. When we reach the place, as the essayist stated, where there is no opportunity of increasing the membership of the dental societies to a greater extent than we have, the question arises whether we are a profession or not. The danger is greatly increased by the fact that we have about sixty colleges which claim to teach the young men of our country to be dentists. While the technique of the various schools is very much improved, thereby necessarily bettering the skill of graduates, the professional spirit is not augmented by such a host of young men coming in as it should be.

The great mass of the dental profession are very hard to arouse and a reform cannot be brought about by any one man, but it must be done by many men in small ways. Let me illustrate. In the little town in Vermont where Judge Wheeler lived (he is the judge who heard the case reversing the decision of the higher court regarding the Low bridge patent) there were five dentists. When I was up there in connection with the suit, I found that four of the five dentists were members of the Protective Association, and it struck me that there must be a pretty good class of men in Vermont. Upon questioning as to how there came to be four members out of five dentists in the town, I found that it was due to social intercourse. These men met evenings in their various offices and a brotherly and professional feeling was engendered, which I am sorry to say is very much lacking in the profession to-day.

This society has had a great record, but not especially great in proportion to the number of years since its organization. We should have at least half of the men in the State members of this society. While there are a great many men in the dental profession to-day who are beyond recall, there are a great many others who ought to be in the societies and helping us with our work, that we do not get hold of.

Dr. G. V. Black, of Chicago: I want to say that I congratu-

late the society and the president upon this address. I have been highly pleased with the discussion I see that the clock is pointing to the hour of twelve and many may not want to sit longer at this session. There are a considerable number here, Mr. President, for the first day in the morning, and I congratulate the society upon that also.

Dr. Garrett Newkirk, of Chicago: May I add just a word? We have here a number of college professors who are engaged in teaching young men. I want to suggest that every graduate of a dental college ought to be pledged before he leaves college that he will become a member of some good, live society.

Dr. R. N. Lawrance, of Lincoln: A dog will be a dog in any country. No code of ethics, no local or State society nor any amount of teaching can make a gentleman out of a chump.

Dr. T. L. Gilmer, of Chicago: I do not know from which college the man spoken of by the gentleman who has just addressed you is graduated. We have many so-called colleges in Chicago that are not colleges. I am fully conversant with the fact that in the two large colleges in Chicago there is scarcely a teacher who does not teach ethics throughout the entire course. There are gentlemen present graduated from the school with which I am connected who know that this is a subject the importance of which I am always reminding them. I know that we do not teach any such doctrine as the gentleman has indicated.

I wish to compliment the president on his address. I was very much pleased with it. I have been a member of this society for so long that I have grown old in the work; indeed, I wear a badge, and have worn it for two years, which indicates that I have been a member for over twenty-five years. I know something of what this society can do for dentists. Yes, it pays in every way to be a member of a society of this kind, and I am not ashamed that it does pay. I would like to tell you, if I had time, the many things that I have learned from the Illinois State Dental Society, but there is not sufficient time. I have attended twenty-six of the twenty-eight meetings, and it would take me a good while to tell you all that I have learned in that time. I do not believe we should feel unhappy because the society is not larger than it is. You must remember that we have a great many other societies in the State of Illinois. We have in Chicago a membership of six or seven hundred. The local socie-

ties are all doing good work and there are a great many men who are members of these societies who are not members of this. It is desirable that they should be members of the State society, but not essential, as they can grow and develop in the other societies.

Dr. J. A. W. Davis, of Galesburg (closing discussion): I just have a word or two to say. First, in regard to what Dr. Noyes said relative to the way the old time dentist felt about the profession, and the seclusiveness manifested. He was not to blame for it then; they looked upon it as some men do now who are inventing something. You do not take a man into your laboratory if you are going to invent something that you believe will bring you a hundred thousand dollars. His skill was his bread and butter, his capital, and therefore, he thought if he took others into the secret he was giving away his own. He did not know that it would help him along instead of taking away from him, as we know now.

Also a word to Dr. Newkirk in regard to meeting in Chicago. I really believe that we can greatly increase the membership if we go there. It is not like it was when we met there last. It was almost a village then compared to what it is now. There are so many dentists there now that I believe we can get 200 easily, and I believe it will be a great benefit to the society to meet there.

Another word to Dr. Pritchett. His remarks make me think of a man who is going to get married. He was talking with a friend, and finally he began to shed tears; his friend wanted to know what was the matter; well, he was going to get married, his wife might have a baby, and he was afraid the baby might die. I would say, "Sufficient unto the day is the evil thereof."

AMALGAM.

By C. P. Pruyn, M. D., D. D. S., Chicago, Ill.

This old subject of amalgam is ever new, for where an ounce of gold is used for filling teeth a pound of amalgam is used; and when we think of the anathemas that have been hurled at amalgam per se, it makes us feel that these curses had better have been heaped upon the heads of the careless operators rather than upon the material itself. It is my experience and observation that the thorough preparation of a cavity and thorough packing of a poor amalgam will yield better results than we usually see from the average packing of a good amalgam. And this one point of thoroughness and carefulness in the proper preparation of a cavity for this material and its thorough insertion is of such vast importance that it cannot be too thoroughly emphasized. It is very unfortunate that so many of our practitioners have the idea that the public think amalgam to be a cheap material, and that they cannot make a sufficient charge for the amount of time consumed in putting in a good filling. This is one of the main causes of such poor amalgam work being done. I think the proper method is to disabuse the mind of our patient of the erroneous fact that amalgam is a cheap material. If my patients ask what my prices are for amalgam fillings, I tell them I put no prices on the amalgam; that I make no charge for the amalgam I put in the tooth, neither for the gold I put in the tooth, but that as a professional man I charge for my knowledge and skill and ability in rendering my patient a service, and I charge them for the time consumed. If I consume two dollars' worth of time, I charge them two dollars. If I consume ten or twelve dollars' worth of time in putting in an amalgam filling, I charge accordingly. I think that is the only honest way to practice; for I am thoroughly convinced that there are many cases of badly decayed teeth that could be much better preserved by the use of amalgam than with gold, and the use of a combination of the two

materials in one tooth has proven in my hands to be very satisfactory.

I fill the distal surfaces of badly decayed molars and bicuspids with amalgam, often extending to the occlusal surfaces, and filling the mesial and part of the occlusal with gold, having the two metals in complete apposition in the same tooth. Indeed, these two metals should never be used in a tooth without coming in complete contact. By being in complete contact the affinities of each are satisfied and short circuiting results with an oxidation of the baser metal, and a clean bright surface left to the gold, and as a result a peculiar condition results with the amalgam filling. It may be that the oxidation fills in the crevices about the edges of the amalgam filling, making closer joints, or it may be that a peculiar electrical condition prevails which prevents the growth of bacteria and consequent decay. I frequently see some of my patients in whose mouths I have placed this combination twenty years ago and the work still holding to-day very satisfactorily, and I am satisfied that it is doing better work than either gold or amalgam would have done if they had been placed separately.

Proper contouring can be done with amalgam just as well as with gold, and many times better; and the point made by the adherents of the new school of practice, that ptyalism, or mercurial poisoning is often the result of the use of amalgam in teeth, is something I have never seen in all my practice.

I should like very much if this disputed point could be scientifically ascertained.

In the preparation of cavities for amalgam there should be no beveled edges left, as we know that amalgam will not retain an attenuated edge, as it will crush under the force of mastication. So there should be broad, straight borders.

The present craze for gold crowns is often carried to the extent of crowning teeth that could be much better saved for years of usefulness with well inserted amalgam fillings. I am satisfied, in my own mind, that many cases of extensive decay in molars and bicuspids could be much more perfectly filled with the use of a continuous band matrix, which should be retained in position for several hours after the completion of the filling or until the amalgam has thoroughly set, as otherwise good fillings with this material are frequently injured before the patient leaves the office, perhaps by the careless removal of the rubber dam or hand matrix,

or by the opposing cusps of teeth before the amalgam hardens. We know from experience that amalgam does its best work at the cervical borders ; we know also that gold does its best work on the occlusal surfaces. Now, by using these two materials, each in its own place, where it can exert its greatest field of usefulness, we can combine the two materials and thus preserve frail teeth much better than by using either one alone.

A very good object lesson for any one is to use glass tubes for packing amalgam. Take a glass tube about the size of a small lead pencil, one-quarter to one-half an inch long, shellac it upon a piece of board, then wind about the glass tube some paper, and proceed to insert the filling as you ordinarily do in practice. Remove the paper, and carefully observe the air spaces that you will see between the filling and the glass tube; then take another tube without the paper wound about it, and proceed as before, carefully examining each step of the operation as you go on, and carefully note the extreme care that will be necessary to thoroughly adapt the amalgam to all the sides of the glass, so that no air spaces can be seen.

While this is a very simple experiment and can be made very easily, it is an object-lesson that I think every operator should witness.

While a dozen different men might fill a dozen different holes in a steel plate with the same make of amalgam, and very little difference would result in the measurements afterward, I am convinced that when it comes to the practical work in the mouth, the personal equation forms a much larger factor than we are oftentimes led to believe.

DISCUSSION.

Dr. T. W. Pritchett, of White Hall: I have thought it best to make a few notes of what I shall say upon this subject, written before coming to the meeting and being entirely independent of any knowledge of Dr. Pruyn's lines. I offer these notes rather as a keepsake of the society than any particular wisdom that you will get from their reading.

This is an old and very interesting theme for a dental society to discuss. Old, because of its extensive use in filling operations during most of the present century. Interesting, because of the fluctuation of opinion entertained by the profession as to its merits for the purpose used. Interesting, because of the ample space it

holds in the literature of dentistry by means of books, journals and papers. Interesting, because every manufacturer makes the best in the market, and every practitioner swears by his own selection. Interesting, because from away back it has apparently been a great liar and deceiver of men. Recent investigation, however, accords to it the very essence of truth-telling and veracity, according to formula and according to rule. In the past, certain observed effects were thought to be due to expansion, when in reality contraction had taken place. Others believed contraction had taken place, when in reality expansion was the effect they saw. In many instances, we may now believe, they saw both effects in the same case. In some instances they were probably right, and more often perhaps they were wrong.

Those were the halcyon days of big ditches around cavity margins in one or more years from the time of the insertion of the filling. Whether due to contraction or expansion, or both, the practical result was the same—leaking margins and recurrence of decay established or invited.

It is a curious fact to note that notwithstanding the confusion of knowledge that existed upon this subject, a great deal of quite satisfactory work has been performed with this perverse material, better perhaps than with any other at our command. It is also a curious fact that the most wretched failure has been quite as often the result of the most painstaking care, and it is little wonder that some have said, "I will have none of it."

But thanks to the perservering faith and laborious research of a few—led by our gallant Nestor—a new era, a new dispensation has been ushered in. And if in-the-mouth experience shall confirm out-of-the-mouth demonstration, then will amalgam have a fixed and recognized status, until superseded by something more in harmony with tooth color, and with perhaps other desirable properties not known to us. The profession has for some years been looking for some cunning workman in metals to produce an alloy that would keep tight margins in a tooth cavity. Have we got it at last? Crouse says we have, and that its name is Fellowship. Kester says—but Kester is a very modest man, and besides he has no organ—others say, however, that Kester's special will neither shrink nor expand. Other testimony might be mentioned, but these will answer our purpose.

Now that it has been clearly demonstrated that alloys can be

made that give perfectly satisfactory out-of-the-mouth tests, it is the duty of the profession to accept them, and improve its skill in their application to teeth in the mouth, and thereby remove much of the opprobrium that has clung to this material for so many years. Doubt of the stability of the form of the filling, after being made, may have begotten careless habits of preparation of cavities by many of us. Also many of the nice manipulative details that are essential to success with any material, may have been left out. If any of us are at fault on these lines we must amend. Indeed, these are piping times of progress. The standard each year rises higher and higher, and he who would march in the front rank must keep right in the middle of the road, lest the enemy of progress capture and hold him a perpetual prisoner.

Do we all possess mechanical and manipulative skill alike? Certainly not, or we would have no need of the clinic. The obvious intention of the clinics is to teach. Are we getting the most possible good from this object method? Let us see. This society is thirty-four years old. I doubt if the record of the clinics would show twenty amalgam fillings made in all those years. Of this small number, how many of the members saw any considerable part of the procedures? But few, necessarily. We may as well write failure to this part of our society work. Can we do better? I will suggest a scheme. Let the supervisor arrange, say next year, for from six to twelve clinicians to demonstrate filling cavities in teeth with amalgam out of the mouth. Let each clinician prepare from six to twelve or more cavities, and arrange the teeth so prepared in some convenient and practical manner, as in the mouth. I will enumerate some of the advantages that might be derived from carrying out such a scheme. The preparation of such a number of cavities would most likely be of much advantage to the operators themselves. A critical examination and careful study of such a number of prepared cavities by the society would be of very great advantage to the members. The filling of such a number of cavities, in which such a variety of the details, management (the personal equation), could be demonstrated to so many of the members, that much good should result therefrom. With such a number of cavities the clinic material would be practically without a limit. They could be filled over and over again, the whole society taking a hand at it, and with but little exhaustion to itself.

I will now say what I might as well have said in the beginning, and have said no more, I believe what we most need now is a better acquaintance with the technique of our best operators in the application of amalgam to cavities in teeth in the mouth.

Dr. W. A. Johnston, of Peoria: I found out this morning after I entered the room that I was on the program to take part in this discussion. Through some mistake of Uncle Sam no notice came to me from Dr. Allen.

Amalgam has been at once my hope and my despair, my joy and my sorrow, the birthplace of my expectations and the cemetery of all my realizations. It has been the salvation of many teeth and the destruction of many others, and the question naturally arises, why is this thus? The keynote of Dr. Pruyn's paper was thoroughness, and this one word seems to answer all the questions as to the reason of failures in the preparation and filling of teeth with amalgam. Perhaps the reason for lack of thoroughness is that we do not charge for our time. A great many dentists, possibly the majority of us, have a fixed charge for inserting an amalgam filling. In a gold filling we are more apt to charge for the time consumed in making it, but a great many of us are apt to lump off amalgam fillings at a certain sum. That is certainly not an encouragement to good work. The personal equation Dr. Black said two years ago entered very little into the success of amalgam fillings in steel tubes. It certainly does enter to a large extent into an amalgam filling in the mouth or into any other filling for that matter, and while it may not enter very largely into the shrinkage or expansion or the flow of a certain amount of amalgam in a steel tube, it begins further back with a filling in the mouth, with the judgment exhibited in choosing the proper filling material for the tooth. That is where the personal equation comes in, where the skill is manifested and where the question of failure or success must necessarily be. The combination of gold and amalgam I think has been largely neglected. Possibly we have all used it, but I have not heard of it being used sufficiently to make me think that the subject has really had a proper amount of attention, or that it had been used enough for us to know whether or not it is the ideal filling material. If amalgam is better at the cervical margin and gold is better at the occlusal surface, why should not the ideal filling material be a combination of amalgam and gold? The continuous matrix to be placed upon the tooth is made very

easily of German silver, the band being tried on, taken off and soldered. Surely in a great many cases this would be a very great advantage in the contouring of amalgam fillings, and in saving them from the breakage which so often occurs before the amalgam has become fully hardened.

The continuation of the same paper by Dr. Pritchett was very interesting, and his suggestions were very good. The paper of Dr. Pruyn was an excellent one, and it ought to be thoroughly discussed.

Dr. E. H. Allen, of Freeport: I cannot say very much about amalgam in an experimental sort of a way, but I have been impressed by some observations that have come to me. The success of amalgam work I believe lies in the individuality of the operator who prepares the cavity. As beautiful an amalgam filling as I ever saw was in the mouth of a young lady who happened to fall into my hands for treatment. She had in a lower first molar a beautiful amalgam filling; all the margins simply perfect. Talk about perfect margins in gold fillings. You could not imagine anything more perfect in gold than the margins of that amalgam filling were. I asked her who inserted that filling, and she said Dr. McKellops, of St. Louis. Now, I am aware that Dr. McKellops declares that he never put in an amalgam filling. Of course, it is possible the young lady's memory may have been at fault as to who made that particular filling. But still if Dr. McKellops did insert that filling he need not be ashamed of it. But the point that I wished to bring out more was the perfect preparation of the cavity, and I believe that is the one particular point in amalgam work, carefulness of detail in preparing margins and everything about the whole operation, and when finished you will have a beautiful filling. Of course, I have been led to think that some amalgams I have used have brought about better results than others, but, as I said in the beginning, I believe the most important thing is the perfect preparation of the cavity.

Dr. W. A. Stevens, of Chicago: In the first place, as far as amalgam is concerned, I want to make the rather bold statement, that according to the number of teeth that are filled with amalgam you save just as many as you do with gold. I do not think there is a particle of difference. At the same time you will fill teeth with amalgam that you could not possibly fill with gold. Now, I claim that I do use amalgam. I have heard members

of this society claim that they did not use amalgam, and yet they buy five ounces at a time. But I do use amalgam, and the greatest amount that I ever bought at one time was one ounce.

Dr. EDMUND NOYES, of Chicago: I rise to a point of order. It seems to me a rather severe thing for Dr. Stevens to say that members of this society assert that they never make amalgam fillings, and also to say that they buy amalgam in five ounce lots.

Dr. STEVENS: I did not say that they said it, but I have heard them state that they did not believe in amalgam and would not use it, and yet, at the same time, the dental depot agents have told me that they sold them five ounces at a time. Now that is only a question of veracity between the agents and them. I want to know what you are going to do with a tooth like this (referring to blackboard). You have a cavity here which is decayed like this (indicating). What are you going to do with that? There is a cavity which is decayed probably clear through here (indicating), leaving the labial and buccal surfaces perfectly sound. Are you going to fill that with gold? Are you going to fill it according to Dr. Pruyn's idea? I would say so far as my own operations are concerned that I have saved just as many teeth with amalgam, in proportion to the number that I have filled, as with gold, the conditions being the same. I have made some poor fillings with amalgam and I have made some poor fillings with gold, and I have used some poor alloys and I have used some good alloys. What are you going to do with this? (Indicating.) I would fill that tooth with amalgam simply for the saving of the tooth. If you attempt to fill that tooth with gold it is an utter impossibility, in my opinion, to fill this part (indicating) so as to make it perfect. Suppose it to be upon the inside next to the tongue. My process for doing that is as follows: I make a band, as mentioned by Dr. Johnston, using Tagger's tin. I have in my operating case a pair of shears, Tagger's tin and a small soldering iron. I band that tooth perfectly and bring it tight to this surface (indicating), and if I want a contour to it I bring it out there, and I fill that with amalgam, and I have seen those fillings remain in the teeth eleven years after they have been filled.

Dr. GILMER, of Chicago: How long do you leave your matrix on?

Dr. STEVENS: At least twenty-four hours.

Dr. GILMER: How do you get it off; does not the amalgam unite with the tin?

Dr. STEVENS: I get it off very easily, just take a knife and cut it. I have never had the amalgam unite with it; some people may have, but I never have. A patient came to me a few days ago and I wanted to save the wisdom tooth. They could not afford to pay for a gold filling, but I could fill that tooth with amalgam and save it a number of years, and next year I will report on it if I can get a chance to see it in the mouth. That tooth is decayed down clear across there (indicating). You see a margin encircling that tooth perfectly. I filled that tooth only last week with an amalgam, putting the band on as I mentioned in the case before, fitting the band as nicely as if I were going to put a gold crown on. This shows amalgam all around the tooth and here is my foundation down as low as this to hold it in (indicating). Now I believe that tooth will stay there at least eight or ten years. I do not know about the case of Dr. McKellops. I know one time he said that he sent a case to Dr. Atkinson, of New York, and asked him to fill it with gold, as Dr. Atkinson said he never filled with anything but gold. Dr. McKellops tried to fill it with gold two or three times and failed, and Dr. Atkinson tried to fill it with gold and failed, and finally filled it with amalgam. What are you going to do with teeth of that kind? Are you going to pull them out if the patient cannot afford to pay you for filling them with gold? I do not advocate the use of amalgam in every case, but I do advocate the use of it, if it is used judiciously and discriminately. I I take exactly the same pains in preparing a cavity for amalgam as I do for gold. There is seldom any case like this but what I have to use the rubber dam, but there are many cases in which I can use simply a napkin in the mouth, and with the saliva ejector I believe you can keep the mouth dry from ten to fifteen minutes, if the saliva does not run like a river, as it does in some mouths, but these are few. I have one more to fill in the same lady's mouth that is broken down similarly, but I am not sure whether the pulp is alive or not; I am testing it now to see. If you will take the same pains in preparing your cavities for amalgam as you do for gold, and then compare them equally with each other, the conditions being the same, you will find that you will save just as many teeth with amalgam as you do with gold.

Dr. G. V. BLACK, of Jacksonville: I hardly know where to

begin or end on this subject of amalgam, but let me first speak of use of the matrix. I would say, do not put a band around a tooth; I would not solder it to make a matrix in which to build an amalgam filling, but cut your band of sufficient length to cover the missing axial surface of the tooth, whatever that may be. If it be the mesial or the distal, let it go far enough around to cover those missing surfaces, and then tie it tightly to the neck of the tooth, and you will have a matrix fitting closely to the gingival walls of your cavity, wherever those walls may be. Now, it is simple, easily applied and you get it just where you want it, get it to fit your tooth where you need to have it fit your tooth, and you can wrap it as far toward the occlusal portion of the crown as you choose. Perhaps brass or copper rolled thin and annealed immediately before using makes the best matrix, because it is sufficiently pliable to be contoured as you like and the amalgam will not adhere to it. In many cases thin steel is excellent. Tin is not so good because of the liability of the amalgam to adhere to it.

As to the preparation of cavities for the amalgam, I should say that there should be no difference in the care used between the preparation of cavities for amalgam and for gold. The same care, and generally the same forms should be used. The same care in seating the filling, giving it a broad, flat seat upon which it may support the stress that may be brought upon the filling, and giving it sufficient anchorage so that the dipping strain may not move the filling from its position. All of these points need to be guarded in the making of amalgam fillings with more care than with gold, because there are none of the amalgams that are as strong as gold; hence we need to exercise more care as to the squaring of our seats, making them broad and strong, and more care as to the forming of anchorages, that they may be strong enough to support the filling. There is also much in the manner of inserting the filling; the mode of manipulation makes much difference as to the strength of the amalgam after the filling is made. We may have too much mercury in our mass and our filling will be weak; again, we may have too little mercury in our mass and our filling will be weak. Just about a certain proportion is necessary and that varies with the alloy used. All of these things come in in making what is termed personal equation. There is one thing, however, that personal equation will not affect, and that is the physical characters of the material. They

will remain the same no matter who manipulates it. Now, I want to make this statement, an alloy that shrinks cannot be so manipulated as not to shrink; it may be slightly modified, but it cannot be so manipulated as not to shrink. An amalgam that expands cannot be so manipulated that it will not expand. This is a physical property of the material and cannot be changed by any method of manipulation. Any one who thinks differently will have the opportunity of testing it in the tubes that we have here, and I shall be heartily glad for the test to be made by any one, because if there is any manner of manipulating the material so as to change its physical properties in this respect, we want to know it. I have not found it out yet in three years of careful effort. I have had gentlemen at Albany try it, I had the gentlemen at Toronto try it, and I have had gentlemen in Chicago try it, and they have tried it over and over again, and not one case has occurred yet where I can safely say that there has been any change made by the method of manipulation. So that this matter of shrinkage and expansion is not a personal factor at all in the placing of amalgam fillings. Other features, however, do become personal factors. The matter of close packing is important, and generally it requires a good deal of force to pack amalgam properly, and furthermore, it requires an amalgam of certain physical properties in order that it may be packed perfectly. I will venture to say this, that there is not a gentleman in this room that can take the ordinary amalgams now upon the market, (there are some exceptions to this, I am glad to say) and take one of my tubes and make a filling in which the margins will be anything near microscopically perfect. We can see between the tube and the filling in every case. Neither can they do it in the teeth, even if the amalgam did not shrink. A considerable number of gentlemen have had enough experience in making experimental fillings to corroborate or deny this statement from their own personal knowledge in the effort to make close fillings with comparatively soft amalgams.

I do not know, Mr. President, whether I should present some of the features at this time that have been discovered in amalgams as a kind of a report; perhaps not, but I owe to the society a report of what has been done in the discovery of the physical characters of amalgams. This society has rendered me substantial ssistance in this work, and I feel that I owe a report to this

society. Perhaps now would not be the best time to make such a report. And that report will show valid reasons why with the same alloy, out of the same bottle and with the same care and the same manipulation, one filling may be perfectly good, retaining its margins perfectly for years, and another may be perfectly abominable.

Dr. STEVENS: I would like to ask a question. He says he would put a little band on one side. In the case which I represent the whole top of the tooth is gone. How are you going to get around that?

Dr. BLACK: I would tie my band all around. So much of the walls that are missing should be supplied with the matrix.

A MEMBER: Is there any objection to using thin German silver and burnishing it down to the tooth and using a small wooden wedge?

Dr. BLACK: Only that a wooden wedge does not support the band very well and is an unhandy thing to use. I sometimes hold it with a separator, but a ligature is the easiest way to do it.

Dr. PRITCHETT: I was not quite clear as to what you stated in respect to the amalgam from one sample, the one case would be good and the other abominable. What amalgam were you referring to at that moment?

Dr. BLACK: I might refer to quite a large number of alloys that are on the market.

Dr. PRITCHETT: Does it refer to what we might call improved amalgams now?

Dr. BLACK: We may make amalgams now in which those physical changes will not occur. I can now state, I have observed them for two years.

Dr. T. W. BROPHY, of Chicago: There were some statements made in Dr. Pruyn's paper which occurred to me at the time were not in accord with the experience of many practitioners, certainly they were not in accord with my own experience. If I remember correctly, he stated that the reason why, at least, one reason why he made use of amalgam at the cervical margin and finished with gold on the occlusal surface, was that amalgam failed on the occlusal surface while it was a better preservative of the teeth at the cervical border, and about the proximate surfaces, or words to that effect. It seems to me that this is a mistake. I am of the opinion that nearly all the practitioners who find it necessary to

remove amalgam fillings because of their failure, do so because they fail at the cervical border or about the walls of the proximate surface. Moreover, I see no reason why a practitioner should make use of amalgam upon the proximate surface and down at the cervical border and finish with gold. If I were to make use of amalgam in a case of that kind I would finish with amalgam. I do not understand the philosophy of making a base of poor material and then finishing with good material. I desire, in this connection, to say in a general way that the whole discussion of this subject is only a revival of discussions which occur periodically. In my connection with the dental profession, extending over a period of thirty years, I find that this question comes up about every fifteen years. When I was a student in the Pennsylvania College of Dental Surgery there were no amalgam fillings inserted while I was there. So prejudiced was the dental profession against the use of amalgam that it was discarded and its use was not taught in the school. It was mentioned and spoken of as being so objectionable as to be unworthy a place in the school. A little later it began to be revived, through the efforts of Dr. J. F. Flagg and Dr. Palmer, of Syracuse, N. Y., and Dr. Chase, of St. Louis, and now it has grown to enormous proportions. I do not know how many kinds of alloys are made in the United States. I made the remark in company with a few gentlemen this morning that I presumed there were at least 200 different makes of alloys; one said that my estimate was very conservative. If there are 200 different kinds of alloys prepared for the use of dentists, I do not think there is any doubt that of that number a very large majority are unfit for use, because of their cheapness, being made of material that is not fit to be used as a filling material for the teeth. Now, presuming that twenty-five to forty per cent of the different kinds are good; we see the effect, and I tell you this whole amalgam question is demoralizing to the dental profession and it is a condition of things that is absolutely deleterious to the people that employ dentists. One gentleman said that he saw an amalgam filling that was put in by Dr. McKellops. I do not want to question anybody's statement, but I do not believe that Dr. McKellops put in that amalgam filling. He has repeatedly stated that he has never put in an amalgam filling, and I have no reason to question that statement. I think there is some mistake somewhere. It has clearly been shown to us that the statements of patients are unreliable, not because of their

desire to deceive, but because of their inability to remember; and I will venture to say if the case that was spoken of is traced back it will be found that some other dentist than Dr. McKellops put in that amalgam filling. If there is anything on earth that Dr. McKellops abhors it is amalgam. I hear men state, who are somewhat indifferent as to the progress of our profession, that distinguished representatives are advocating the use of amalgam. These men who are not strictly honest in practice (and I am sorry to say there are quite a number of such men) make use of anything, no matter what, and they hold up as an argument that many distinguished men use amalgam, advocate its use and so on, and so the public are getting the worst of the argument. I do not believe there was ever a material made with which to fill teeth so good as gold, and I believe this discussion of the amalgam question is demoralizing, and yet I hope and expect that the result of the experiments that are being conducted will enable us to get a better material than the amalgams which we are now acquainted with. In a conversation with Dr. Leslie, of Cincinnati, he claimed that an amalgam was made fifty years ago by him that would compare quite favorably with anything at the present time. He claimed that the best amalgam he ever used was that made by filing a Mexican coin. We know that is largely silver and has a small percentage of copper, and if that kind of amalgam made fifty years ago would preserve teeth for forty years, as he claims, it certainly must have been as good as the best amalgams on the market to-day. We are short in clinical experience in regard to the new alloys. Experimentally they seem to be an improvement, but I believe the environments of the alloy when placed in tubes are altogether different from those present in the mouth and that we need and must have an experience extending over a number of years before the question can be settled as to the merits or the advantages of special alloys. We all know what a furore the copper amalgam created a few years ago. It did not seem to shrink, made a fine edge, a good surface and was apparently better than anything that had been found, but I do not know of any one now who is using it to any extent—because it failed—clinical experience demonstrated that it was a failure. Now we must have clinical experience to back up these experiments that have been made to determine whether these metals or alloys when used for the filling of teeth will answer our purpose. I believe amalgam is a material upon which we cannot rely for the preservation

of the human teeth, and that there is no material in existence, according to our present knowledge, upon which we can rely except gold.

Dr. J. N. Crouse, of Chicago: I think the essayist made a great mistake in his conclusions as to why amalgam fillings failed. He made a statement that it is due more to the manipulation than the material, and I think he is far from the truth. The fact is, that with most of the alloys on the market the more you try to pack them perfectly the worse kind of a filling you get. It is impossible to pack the soft amalgams and make perfect margins. I have had the opportunity of collecting specimens from various offices throughout the country, and the amalgams that were used the most could be the least relied upon. With many of them you can make the best filling simply with your finger. Most of them shrink so much in the steel testing tube that the fillings will drop out of the tube. Any man who watches these things will be very indignant at seeing what the practitioners of this country have been using as filling material. I say that the quality of the alloys accounts for the failures, and I only wonder that amalgam fillings do not look worse than they do.

Dr. C. N. Johnson, of Chicago: I hesitate somewhat to say much upon this amalgam question. A few years ago I could have talked very glibly upon it, but I am not so sure of my ground to-day. However, there are a few points that I want to mention. One was in regard to the method of manipulation. I believe the essayist made the claim that the reason better results were not obtained with amalgam related particularly to the method of manipulation. That has been spoken of several times during the discussion of this paper. But I want the impression to be permanently settled in the minds of everybody here that the majority of alloys upon the market to-day cannot, by any method of manipulation, be made into perfect fillings. It is undoubtedly true that a careful operator will do much better and more satisfactory work with amalgam than a poor operator, but we cannot change by manipulation, so far as I know, the intrinsic qualities that lie in the majority of amalgams. And in regard to his filling the cervical third of the proximate surface of a cavity in a molar or bicuspid with amalgam and completing the filling with gold, I know that he has done some very nice operations of that kind, and I believe if that method is successful at all it will be successful in the hands of

such a skillful operator as Dr. Pruyn. But I say here to-day, that for myself, so far as the element of labor and the difficulty of the operation is concerned, I would rather fill that cavity with gold than to fill it part way with amalgam and complete it with gold. I can do it with less trouble to myself. The perfect manipulation of a high grade amalgam is a more difficult problem in my hands than the manipulation of gold, to obtain the best results that can be obtained with either material. I want to commend what the essayist said in regard to "filling versus crown work." I think he made an admirable point, and I do say that I would prefer building up that tooth that was broken down, even with amalgam, and doing the best I could with it for a few years, rather than to crown it at that time, because I consider that I have gained just the number of years of service for that tooth that the filling lasts. It will last just as long after the crown is put on when the filling fails as it would before the filling was inserted.

Now, in regard to this question of frail teeth. I want to say that if we are going to save teeth at all it seems to me that above all teeth the frail teeth are the ones that demand gold. If we are going to make a serviceable tooth out of a given case, the frail teeth are the ones that demand the strongest margins to the filling. Gold will protect frail margins and walls better than will the best amalgam on the market to-day.

Now just one word regarding this matter with reference to Dr. McKellops and the amalgam filling. Do you know that when that filling was described by Dr. Allen, the beauty of contour, the high polish, the perfection of margins, etc., it reminded me very vividly of one of Dr. McKellops' platinum and gold fillings, and I believe there is such a thing as the operator being mistaken as to the character of that material. I do not say that Dr. Allen was mistaken, but I say that there was that possibility, because when the darker shades of platinum and gold are used, the color is precisely the same as fresh amalgam.

Another thing that Dr. Stevens mentioned—I do not suppose that Dr. Stevens would be very comfortable if I ever followed him up in a discussion without rapping him a little—he made the statement that Dr. McKellops attempted to fill a certain tooth with gold and failed, and that he referred it to Dr. Atkinson, I believe, who tried three or four times to fill it with gold and also failed, and then compromised by filling it with amalgam. I

would like to inquire a little bit closer into that and learn wherein they failed to fill that tooth with gold. I want to learn the nature of their failure. If I know anything about the ability of Dr. McKellops as an operator, or of Dr. Atkinson as an operator, I cannot conceive of either of those men undertaking to fill a tooth three or four times with any material and failing. I think that they would have had judgment enough to teach them as to whether or not they could insert a filling of that kind before they began.

Dr. R. H. Kimball, of Chicago: I want to say a word. I do not want to be regarded as a champion of amalgam, and not favoring gold. I consider that there is no material for saving teeth that begins to compare with gold; and yet, teeth have been filled with amalgam, teeth are being filled with amalgam and they will be filled with amalgam as long as there are dentists, and if we are going to use amalgam we want the best that can be had. I have listened to the discussion to discover if it were claimed by any that all teeth can be saved with gold; that has not been claimed. I want then to say a word for amalgam for those teeth that cannot be saved with anything else but amalgam. I believe that we need to strengthen ourselves along this line of work. I have amalgam fillings that are saving teeth to-day and have been in for fifteen years. I put them there because the conditions seemed to require amalgam, not that I would not have preferred to use gold, if it could have been used. We cannot rule amalgam out by anything we may say here to-day against it. We ought to consider those teeth that cannot be saved in any other way than by the use of amalgam, and welcome the advent of a superior amalgam that will help us to do this better. I think we ought to be honest with ourselves and admit that we have to use amalgam sometimes.

Dr. Garrett Newkirk, of Chicago: I just want to say a few words in anticipation of the report that we are about to hear from Dr. Black. Now, one of the gentlemen connected with the investigations, said last night, "I am afraid that whoever conducts this kind of an investigation, as we are doing here, is liable to be accused of partiality. If the reports happen to favor one or two or three manufacturers of amalgam and are against twenty or thirty others, those who are conducting the experiments are liable to be accused by interested parties with having been partial." Now, this is simply a scientific investigation. That microscope

shows no partiality; the gentlemen who are handling the microscope are not disposed to show any partiality. That micrometer is correct, as nearly as anything can be made; it simply tells the truth, and it does not matter where the chips fall; let them fall. For my part, if I can find one amalgam, or two or three that I have reasonable assurance will give me success, according to scientific investigation and demonstration, I am only too happy to find them, and I do not care who makes them. What we want is simply the truth in regard to amalgam, no matter who is hit. Whoever gets hurt, we and the people generally will be benefited. So I hope there will not be on the part of any one a disposition to disparage in any way the honest work that is being done.

Dr. G. V. Black, of Jacksonville: A little over three years ago I began this work of experimenting with amalgams, and I exhibited the first steel tube with an amalgam filling before this society at the meeting three years ago. I wish now to speak simply of what has been accomplished, or what has been found out in this investigation, as a kind of report of what I have done. I find it very difficult for men to understand what has been learned and how it is related to the amalgams for use and how it is related to the manufacture of amalgams; and it is that point particularly that I wish now to bring before you. In the first paper I published in 1895, I only exhibited—with the exception of a few fillings—the condition of amalgams then in the market as to skrinkage and expansion, what they did in the way of shrinkage and expansion. I, however, just at the last had a few alloys made that gave a sharp indication as to what fresh cut alloys would do. Almost immediately after publishing that paper I commenced the study of the effect of the aging of the alloys and various other conditions that were supposed to affect alloys in some way. There were in the report then made a great many things that were utterly incomprehensible with the knowledge we then had. In the study of the aging process, which was known from Dr. Flagg's work, and the work of others, to affect the working properties of amalgam prominently, I quickly found that it also affected the physical properties and the relation to shrinkage and expansion in a prominent way, a thing that had been unknown up to that time. I was enabled, with the instruments then devised and in use, to determine the shrinkage and expansion very accurately. I may say that this society donated to me $200 and I spent $400 for the machine

for this purpose before I got it to working satisfactorily. Then I went to work to find out the exact effects of aging. I did it in two ways. First, after a long search finding, as I supposed and stated, that oxidation caused this difference, and finally finding that oxidation had nothing to do with it, and that the results were due to thermal influences entirely. It required a great deal of search and trial of the different conditions to arrive at this conclusion, but this conclusion was arrived at definitely and has been maintained by results.

The effect of annealing. We may anneal for two years' time at normal temperature, or we may anneal for seven days' time at 120 degrees, or for fifteen to eighteen minutes at the temperature of boiling water; the effect will be precisely the same so far as shrinkage and expansion is concerned. Now, from the fact that this annealing takes place at ordinary temperatures and slowly changes shrinkage and expansion, we have in an alloy cut and put on the market a continual change going on, until the alloy has become completely annealed, and there it stops and will remain stationary at that point so far as shrinkage and expansion is concerned. Now, I have studied every possible combination of silver and tin, and I propose to try to illustrate on the blackboard the movement of the combinations of silver and tin, not running through all, but taking them in gradations of ten. Say we begin with a combination of forty of silver and sixty of tin, and let this be a horizontal line representing time (referring to blackboard), and we make an amalgam filling from that alloy, fresh cut. The first movement will be downward like this (indicating), for about six to ten hours, the time depending somewhat upon the amount of mercury combined with it; the amount of mercury will make very little difference, however, as to shrinkage and expansion. From that point it will begin to rise and will go up like this (indicating), and then drop just a little and remain stationary, taking about five days to accomplish this movement. Now this is when it is first cut from the ingot. If we let that alloy lie for about three months we will have a movement like this (indicating), making about five or six points difference between the two; the one will have swelled up above the margin of the tube, the other will not quite reach the margin of the tube. If we let it stand two years we will find that it makes a movement like this and will stop there, and will remain below the margin of the tube. (Indicating.) The same will

occur if we anneal it five minutes in boiling water, we will get this rise, indicated in the second diagram, or with fifteen minutes of boiling we will get this rise, indicated in the last diagram. Now any movement between those may be had by different time of annealing. Any movement between those may be had at different times in taking the alloy out of your bottle upon your case. Again, we take fifty of silver and fifty of tin, and we will have a movement differing somewhat, in that the shrinkage will be a little more to begin with and will not rise quite so high, and half annealed we will get a movement like this (indicating), and the fully annealed alloy will shrink more and will not rise so much in the secondary movement. Now, if you can hold those in your minds I will place on the board the other combinations of silver and tin so that you can get the gradations. If any gentleman thinks he can escape these movements of silver and tin by any possible means of compounding the alloy, or any possible manner of manipulation, I would like to see him do it. If we take sixty of silver and forty of tin, as the first movement, fresh cut, we will have just a little bit of shrinkage, and half annealed we will have a shrinkage like this (indicating), and fully annealed it will drop down very badly, making a very bad shrinkage, ten to twelve points, making a very wide open margin. Then if we take sixty-five of silver and thirty-five of tin this will run just a little above the line, used fresh cut, usually about one point, depending a little upon the difference of combining the two; if you have a little more tin it will rise a little higher; then half annealed it would shrink, and fully annealed it will shrink badly, usually about nine points, making wide open margins, and it will do this regularly. Now, when I say fresh cut, I mean fresh cut without heating; if it is heated in the cutting machine or with the file it will shrink from the start, because the alloy is annealed by a rise of temperature in the cutting, and in that way we get various conditions. You take this alloy fresh cut and you will make a good filling; you take an alloy that had stood in your office for months and your filling will not be worth anything. Take seventy of silver and thirty of tin, and fresh cut, it will run away up here, expanding greatly (indicating), and half annealed it will rise to here (indicating), and fully annealed it will shrink down here, making a wide shrinkage-expansion range, and we may have anything between those two. Fresh cut, it will raise up in the tube forty points or more, giving

a good deal of variation; but this dual movement, first down and then up, has disappeared; it disappeared with about sixty of silver. Suppose we take seventy-three of silver and twenty-seven of tin, and we will find the amalgam running way off expanding like that (indicating) fresh cut; forty to sixty points rise, and half annealed it will come down like this, and fully annealed like that, that is, it will neither shrink or expand. (Indicating.) And when it has become fully annealed it will remain just so, as I know now, for two years at least, without a change. Now, I put up alloys fully annealed, and alloys with fractional annealing, and in various conditions as to annealing, two summers ago in June, July and August, and those that were put fully annealed produce the same results to-day as when put up; those that when fully annealed were just to zero are the same to-day. Those, however, that would anneal lower than zero, but were stopped at zero, have given away a little. For instance, one formula containing copper and zinc which I put up and which I found would anneal three points below zero, but was annealed fractionally just to zero so that it had no movement up or down at that time. I made a filling of it last week and got a shrinkage of one and one-half points; it had lost that much in that time. Others that were fully annealed and put up at that time, that varied from zero to one and one-half and one point above, gave the same results last week as they did two years ago precisely, no difference whatever. Now, suppose we take seventy-five of silver and twenty-five of tin, and let this represent the zero line; we will get an expansion running away off like that, comparatively (indicating), sixty or seventy points expansion; and half annealed we will get it like this, (indicating) and fully annealed it will still expand five or six points, and by no means can we get such an alloy into a condition that it will not expand. Now I have run through the limits of silver and tin alloys. Now you understand that our formula for silver-tin alloys, pure and simple, will be close to 73–27. It will depend a little upon the person who makes the alloy, how much tin is lost in the melting, and the perfection of the mixing, or alloying. As to the exact formula, we may use from seventy-two and one-half to seventy-three and one-half, and possibly some would need to use seventy-four of silver, depending upon the loss of the metals in melting. But any one undertaking to make such an alloy must do this. I wish to

make this point clear. He must compound his alloy and ascertain just what that alloy will do when fully annealed, then if it shrinks a little he must add a little bit more silver, one-half or one-fourth of a per cent, perhaps, and try again and see what that will do, whether it will shrink or expand when fully annealed. If that is not quite the thing, then he must change his formula a little again until he gets a formula that in his own hands, as he compounds his alloy, will, when fully annealed make an alloy that will neither shrink nor expand. In order to do that he must have the instruments, the arrangement for annealing, the micrometer, etc., otherwise he will simply be guessing at it. When he has found the formula that in his hands will neither shrink nor expand, then he may try it over and over again until he finds that he can make it with perfect regularity so that each batch will produce the same results. Then he is ready to make an alloy for use, or for the market, and not before. And also, he should go over this whole field and know for himself just what this or that formula will do. He must make these alloys in all their gradations right down through, and know for himself just what they will do.

Remember now I have been talking of the silver and tin alloys. Now I want to say a few words as to the modifications of the silver and tin alloys. We will take 65–35 as a basis, for instance, just to illustrate the subject. Now we may add to that five per cent of gold. That five per cent of gold is simply lost so far as effect upon shrinkage and expansion is concerned, with this exception, that the shrinkage-expansion range is not quite so great, about two points difference. It will make an alloy that will work a little bit smoother, and that will be the only effect of the gold that comes out as to the physical characters. But suppose we add copper (you will remember, now, that the line of 65-35 rose just a little and remained straight, while, when it was fully annealed it came way down, making a shrinkage of nine or ten points). Now if we add copper five per cent instead of making this slight rise when fresh cut it will run away up here, thirty-five points, as the effect of the copper, and when fully annealed it will drop a little bit below zero, increasing very greatly the shrinkage-expansion range. So that if we wish to put copper into our alloy, we must learn the effect of copper and be able to gauge the amount of copper in proportion to our silver, so as to make an alloy that when fully annealed will neither shrink nor expand. If we take

zinc instead of copper, then we will have a very different effect. Zinc five per cent, instead of this line rising up quickly, we will have a line that will rise slowly, like this, and keep going and going for forty days, but it will not rise much higher than the copper finally, and when we come to anneal it down, it will come down, not quite as low as the copper, but very much the same. So that we will be deceived with amalgams that contain zinc, very often. If it contains much zinc, we will watch it for the first day or two and perhaps we will think that it has made its movement and stopped; but if we follow it along for weeks afterward we will find that it begins to go and rises and rises and rises. So that zinc is a very treacherous metal, although it is a very useful one. We cannot use much zinc in our alloys, however, unless we can find some metal that will restrain this continued expansion.

Some seem to think that shrinkage and expansion occurs only while the amalgam is setting. There is much of the shrinkage and expansion of amalgam that occurs after the amalgam is fully hard, very much of it, especially if zinc has been used or aluminum. Now, suppose we take out the zinc and put in cadmium, the same amount, five per cent. Well, I would want to start my line at the floor and run it clear up to the ceiling to illustrate the effect for fresh cut; a rise of one hundred points and more; the amalgam will come way out of the tube ever so far, and when annealed down with this formula we never can get it to zero. Now, as to five per cent of aluminum, I never have been able to tell how far aluminum did expand because it always went clear beyond the range of my micrometer. I have followed it to 470 points and it was still expanding. Neither can we make a filling of it because we cannot handle it; it gets so hot that we cannot handle it. How hot it does get I do not know, but if it is not packed quickly into the tube it will fume and fizz and all go into a brown powder that cannot be packed at all.

Continually, gentlemen ask me to give them a formula that will make a perfect alloy. I cannot do it. I cannot write out any directions by which any man can make a perfect alloy. The only way he can do it is to go into his laboratory and work at it until in his hands it is perfect. And they must do this thing themselves. I can write out no directions by which they will accomplish this without taking the instruments and going to work

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at it. Any man who will take the instruments and go through these performances himself can arrive at this.

Dr. J. N. Crouse: There is a combination which does not shrink any which contains a great deal of tin, and yet, it does not make a good filling.

Dr. Black: We make a combination largely of tin, with some copper and zinc, that will not shrink, but it will be a very soft compound, it will possess but very little strength; and furthermore, its working property will be very soft, and I defy any man to ever make in our tubes a filling of it with perfect margins to begin with, because it is spongy, like a piece of dough. You touch it at one point and it seems to move all through the whole mass. You bring it up at this side and it will spring away at that.

Dr. Crouse: Under the pressure of chewing it will change also.

Dr. Black: It will change its form and move out of position, if you have gotten it into position. It will break at very low stress, say a hundred pounds, whereas an alloy constituted of silver and tin in proper proportions, with, say, about four per cent of copper and one of zinc, will stand four to five hundred pounds before it will break.

Dr. Brophy: Do you not believe that the quantity of mercury mixed with the alloy is an important factor in regard to shrinkage?

Dr. Black: Now I want to make that as emphatic as I know how. Free mercury is not a factor at all in shrinkage and expansion. We may vary the amount of mercury almost indefinitely without affecting materially the shrinkage and expansion. The filling made up in a sloppy mass and put in with the finger will shrink or expand almost the same, but not quite so much, as the filling nicely made, mercury properly adjusted and put in with the proper instruments. Let me say this, you take the grades of alloys all the way through and that mass which will make the strongest amalgam will be the mass that is mixed with just enough mercury so that when you press it down carefully and gently you will find the skin markings of your finger upon the surface. If you have more mercury it will be weak amalgam; if you have less it will be weak in proportion, and if you have so little mercury that you have to force the powder together to make it stick, it will be a filling that would break at one hundred or one

hundred and fifty pounds, more or less, in proportion to the dryness or wetness, when if properly mixed it would stand five hundred pounds. In order to make an amalgam of good strength for the alloy which you use you must have just about a certain proportion of mercury, and each one of these alloys differ in the proportion of mercury required. For instance, you take this formula of 65–35 and cadmium five per cent; you want about eighty per cent of mercury with that to make the best filling, fresh cut. If you have annealed it thoroughly you will want about fifty per cent. You take the Fellowship alloy; it requires about fifty to fifty-two per cent of mercury to make the strongest filling. If you undertook to make the strongest filling of the fresh cut alloy it would probably require in the neighborhood of eighty per cent, and so on. The proportion of mercury to make the best filling must be found with each individual alloy.

Dr. G. M. Brunson, of Joliet: I would like to ask you one question in regard to that formula. What would be the effect in regard to expansion and contraction if you modified that to sixty of silver, thirty-five of tin and five of copper?

Dr. Black: It would make an alloy that would expand when fresh cut and would shrink when annealed. It would cross the line.

Dr. J. E. Keefe, of Chicago: Take what you call a perfect alloy, one that neither shrinks nor expands, and after mixing it with mercury suppose you got an excess of mercury in and you squeezed it out and squeezed some of the metals with it. Would that make any difference?

Dr. Black: That is now one of the vexed questions, and I have had quite a little discussion on it with Mr. Fletcher, of England, and I will say that Mr. Fletcher from his observations concludes that it does make a difference. I, from my observations, with better instruments, apparently, to make these observations with, am of the opinion that it does not make a difference. No one has analyzed the mercury squeezed out, or the metals carried out with the mercury, to know whether or not the metals constituting the alloy are carried out in the proportion in which they are found in the alloy, or whether some particular metals are dissolved out in greater proportion so as to change the characters of the alloy. We hope to do that this summer, but it has not been done yet; and the question now as to whether it changes the alloy or not is a matter of opinion.

Dr. J. G. Reid, of Chicago: Take an alloy that neither shrinks nor expands, and mix it with an excess of mercury and then the excess is squeezed out. What effect does that have upon the flow of amalgam ?

Dr. Black: Practically none. I think that a man will get a better result if he mixes the proper amount of mercury with his alloy to begin with, not so much because squeezing out will injure it, but for this reason: You cannot properly knead your mix if there is too much mercury in it. You will not accomplish the kneading that you should accomplish, and right here I must say this, that in the first of my experiments along this line I said that you should not knead your amalgams much—which is correct if you are going to make strong work with the softer alloys—but the alloys that we have found to give the best results, as regards shrinkage and expansion, work into an amalgam very slowly, and it requires a great deal of kneading to obtain the proper condition of the mass. To get a smooth working property they should be kneaded a considerable time, and you cannot do this kneading properly if there is too much mercury in the mass. They need to be kneaded until the granular appearance has fairly disappeared and they will work into a smooth mass.

Dr. Brunson: I would like to ask you in regard to what you advocate, filings or shavings.

Dr. Black: That is a matter of taste. I do not like shavings. In the higher grades of amalgams I like to have it in fine filings. That would be my preference, but so far as shrinkage or expansion or strength are concerned, it does not make any difference.

Dr. Brunson: If I understand these figures that you have made on the board, an amalgam that is partly tempered is much better than fresh cut or fully tempered.

Dr. Black: Not so, not so; you have misunderstood these figures. We want to temper our alloy until we have reduced it to the utmost limit and then it will stay there. You can temper an alloy fractionally until it will neither shrink nor expand and make a good filling, but as that lies in your bottle on your case it will shrink lower and lower until it reaches that utmost limit; and the object of annealing an alloy for use is to obtain permanence, arrive at a condition of that alloy in which it makes an amalgam that neither shrinks nor expands. The idea is this, in

cutting the alloy you harden it, just the same as you harden your gold plate by swaging it—by annealing it you reduce it again to its normal condition of softness. Now that normal condition of softness will be the unchangeable condition, the thing we seek; hence, in preparing an alloy for use we will seek a formula which when fully annealed will make an amalgam that will neither shrink nor expand. Then it will remain permanent, and we cannot get permanence without that; no fractional annealing will do. I started out two years ago on the idea of fractional annealing and I have found that I must anneal it fully. This fractional was based upon an annealing of 350 degrees; fillings made a few days after showed that there was a rise. An alloy annealed at the temperature of boiling water showed no change. But here there must be a care again; the manufacturer will find that out very quickly; he cannot anneal alloys indifferently as to time, or the working property will be so soft that a man cannot make a good filling of it. We must anneal it just the right amount, and when we have annealed it so, it will not shrink or expand. Annealing at a low temperature, 120 degrees, will give the best working property with most of the alloys. And, furthermore, the older your alloy is after a certain age, and the longer you have annealed your alloy after a certain annealing, the weaker it will be.

Dr. W. V-B. Ames, of Chicago: I found that with some of these amalgams I get a better working property by washing with alcohol.

Dr. Black: There is only this danger. I find that if I weigh my mass very carefully just before washing, and weigh it afterward, even though I have taken a dry napkin and rubbed it in that—and evidently I must lose a little by doing it—my mass will weigh more than when I began; and I know that some alchohol is still there; sulphuric ether also remains in the mass, and I object to it, and if I use water there is still more of it there.

Dr. J. N. Crouse, of Chicago: The dental profession is under great obligations to Dr. Black, and much of what I have accomplished has been largely due to the assistance I got from Dr. Black in the way of getting my instruments perfect.

So many ask me why I do not give the formula of "Fellowship" alloy. The only reason is that I think it would be a detriment to the profession, because these "carpet-baggers" who travel over the country and through the cities with a grip, would throw

together a mass of metals and claim it was the same formula as "Fellowship" alloy.

I will give the formula to Dr. Black when he pledges that he will not give it away. I am afraid he has done much harm by giving out formulæ, and he is coming around to my opinion. Dentists have taken his formulæ to the silversmith, had the metals melted up, and the resulting alloys are about as worthless as can be imagined. A good formula does not necessarily make a good alloy.

Dr. Chas. P. Pruyn, of Chicago (closing discussion): I feel very much gratified at the extensive range of discussion that has followed the reading of my feeble paper. Am a little disappointed that the subject of mercurial poisoning from amalgam fillings has not been touched upon by any of the speakers.

I do not believe there is anything in that theory, however, but should be pleased to have this society place itself on record regarding it.

So much time has been consumed in the discussion that in closing the subject I will only reply to one of those who dissented from my views. Dr. Brophy said he was opposed to amalgam—was not taught how to use it during his student days at college.

His remarks it seems to me were of little worth, because of prejudice or former mental bias. He said that gold does its best work at the cervical border, and amalgam its best at the occlusal surface, which is contrary to my observation and experience.

Many of you day after day repair gold fillings that have failed at the cervical margins with amalgam, and you do better service for your patient by pursuing that method. Amalgam is in the market to stay and we might just as well study it carefully, honestly, and use it. Because there are some men who have misused opium, arsenic and other drugs that have been of great value to the world, shall I cast them aside? Not at all. Let us use these things. Let us study them. If there is truth, get the truth; if there is error, let us find the error and discard it, as true and honest men.

WHY COAGULANTS DIFFUSE THROUGH DENTINE.

By E. Lawley York, D. D. S., F. R. M. S. Eng., Bacteriologist in Chicago College of Dental Surgery, Chicago, Ill.

About a year ago I had the honor to present to this society a paper on "The Diffusibility of Coagulants in Dentine." The deductions I drew and the experiments I exhibited at the time showed you conclusively that carbolic acid would diffuse through dentine. Hearing that I was continuing this line of investigation, the chairman of your executive committee did me the honor to request me to read another paper along the same lines, and from the generous and kindly manner in which you received my former effort, I consented. The following is the result of my experiments extending over the past year.

If you remember, I stated at that time that I found that there was greater rapidity in the diffusion of carbolic acid through the dentine of a tooth that had contained a putrescent pulp (four to eight hours). This occurred not once only but in every case, and it set me thinking. Why was there greater rapidity of diffusion in such a tooth and less in one that had contained up to the time of treatment a normal pulp; in the latter we had to deal with a tooth that had so far not undergone any pathological changes, either in the contents of the pulp chamber or the dentinal tubuli, all the albumin that is normally in a tooth being there intact, whereas in the tooth the pulp of which had died, and as a consequence undergone the process of putrefaction and the consequent formation of an innumerable number of end products, we had a totally different condition to deal with. In the first condition we might have an infinitesimal quantity of albumin to deal with, as I will show you later, whereas in the latter we have none, as I will now endeavor to demonstrate.

Many mouth bacteria, as well as the majority of the pyogenic and putrefactive bacteria, have the faculty of dissolving coagulated albumin or albuminous substances, of peptonizing or converting

them into soluble substances, just as albumin is converted into soluble peptones by the pepsin of the gastric juice. Micro-organisms nourish themselves only by substances in a state of solution, and if we present them solid substances they must first liquefy these substances before they can make any use of them for their own nourishment.

After the death of a pulp it is invaded by various bacteria, strictly saprogenic as well as pathogenic, the result of which is that the pulp becomes a foul, semifluid mass. This putrefactive decomposition of albuminous matter is effected by a great variety of microörganisms and give rise to a great variety of products, some of which are volatile and are characterized by their offensive odors. This putrescence was the result of first the splitting up of the albumins into peptones, which according to Flugge may be effected by a number of microörganisms, then the splitting up of the peptones into a large number of gases, acids, bases and salts. Among the products of putrefactive fermentation known to chemists, are the following : Carbon dioxide, hydrogen, nitrogen, hydro-sulphuric acid, phosphureted hydrogen, methane, formic acid, acetic acid, butyric acid, valerianic acid, palmitic acid, crotonic acid, etc., etc. A few words on ptomaines may not be out of place. It is a name suggested by the Italian toxicologist, Selmi, and derived from the Greek word πτωμα, meaning a cadaver.

A ptomaine may be defined as an organic chemical compound, basic in character, and formed by the action of bacteria on nitrogenous matter. They have also been called animal alkaloids, but this is a misnomer, because, in the first place some of them have been found in the putrefaction of vegetable matter, and in the second place, the term animal alkaloid is more properly restricted to the leucomaines, those basic substances which result from tissue metabolism. While some of the ptomaines are highly poisonous, this is not an essential property, and others are entirely inert. Hence the severe and complicated conditions following in some cases a blind abscess, or the opening of a putrescent pulp canal, where we have exercised the greatest care. Since all putrefaction is due to the action of bacteria, it follows that all ptomaines result from the growth of these organisms. The kind of ptomaine formed will depend upon the individual bacterium engaged in its production, the nature of the material being acted upon, and the con-

ditions under which the putrefaction goes on, such as the temperature, the amount of oxygen present, and the duration of the process. Ptomaines are the transition products in the process of putrefaction. They are temporary forms through which matter passes while it is being transformed by the activity of bacterial life from the organic to the inorganic state. Complex organic substances such as muscle and brain are broken up into less complex molecules, and so the process of chemic division goes on until the simple and well known final products, carbonic acid, ammonia and water result.

It is an established fact and will be borne out by the experiments which I will give you later, that the end products of albumin decomposition, or putrefaction, are no longer coagulable. I previously stated in this paper that the first step in the process of putrefaction is the transformation of the albumins into peptones. Now these peptones are not coagulable; for example, if you take pepsin and add it to serum albumin and allow it to digest at body temperature, you will find it is converted into peptones, etc., which are not coagulable. This is precisely the same condition that we find produced by the action of peptonizing bacteria upon proteid matter. (Here exhibit tubes of decomposed serum albumin, and tubes of serum albumin to which has been added pepsin). On the addition of carbolic acid, they do not coagulate.

Now, how does carbolic acid act upon these substances? Does it coagulate the orificial ends of the dentinal tubuli, and seal in all this poisonous matter? Most emphatically, no. The carbolic acid will penetrate as well as anything else you may use.

Let us now take another view of this much mooted question and see how the carbolic acid will act in the dentine of a tooth in which you have removed a normal pulp, one in which the albumin has not undergone decomposition. I stated earlier in my paper that carbolic acid diffused through the dentine of a tooth from which I had removed a normal pulp a trifle slower than one which contained a putrescent pulp. The reason for that was this: That carbolic acid did coagulate the trace of albumin that was there, but the former (carbolic acid) being in excess the coagulum was redissolved again. I will now show you capillary tubes filled with serum albumin (human), native albumin, and artificial serum albumin, and you will notice the coagulation proceeds slowly and following behind a trifle slower you will see that the coagulum is

being redissolved again. This is precisely the thing that occurs in the dentinal tubuli, only we have such a minute quantity of albumin in the tooth structure that it is hardly a factor.

To demonstrate the latter statement to your satisfaction I will give in detail some experiments made to determine the quantity of albumin in a tooth.

Determination of albumin in teeth. The teeth are first thoroughly scraped, removing as much of the adhering particles as possible. They are then carefully brushed with alcohol, which coagulates the albumin on exterior of the teeth. After the teeth are dry, they are finely pulverized.

To this pulverized substance (about ten grams) is added a decinormal sodium chloride solution (about twenty-five c. c.) alkalinized with sodium carbonate. This is thoroughly agitated and allowed to stand for thirty-six hours. During this time the mixture is frequently shaken. It is then filtered until a clear filtrate is obtained, and washed. The filtrate is acidified with dil. acetic acid and brought to the boiling point. This coagulates the albumin. It is allowed to stand for some hours until the coagulum settles and the particles become agglutinated. It is then filtered upon a counterpoise filter. The precipitate is then washed until no reaction occurs upon the addition of sol. of silver nitrate.

The contents of the filter are then dried at a temperature of 110° C. for about thirty minutes, then placed in a desiccator and afterward weighed. The albumin is repeatedly dried until a constant weight is obtained.

The tooth substance after being treated as above, was again subjected to the same process, but yielded only a faint trace of albumin, showing that practically all the albumin had been removed.

7.5 gms. (115.74 grs.) yield .0028 gms. ($\frac{7}{160}$ gr.) $\frac{37}{1000}$ of one per cent.

9.5 gms. (146.60. grs.) yield .0067 gms. ($\frac{67}{640}$ gr.) $\frac{7}{100}$ of one per cent.

11.5 gms. (177.46 grs.) yield .0060 gms. ($\frac{3}{32}$ gr.) $\frac{5}{100}$ of one per cent.

(1) These analyses of the teeth will clearly show you that the amount of albumin in a tooth is of too minute a quantity to be a factor. This applies to a tooth, the pulp of which was in a normal condition when analyzed. (2) A tooth the pulp of which

has undergone the process of putrefaction or albumin decomposition. The end products are no longer coagulable. (3) Had we as large an amount of albumin in a normal tooth as we have always been led to believe, the quantity of carbolic acid which would be accommodated in the pulp chamber and canals would be quite sufficient to redissolve any coagulum that would be formed.

Recapitulation. I have shown you capillary tubes containing egg or native albumin, serum albumin (human), and artificial albumin, all of which coagulate in the presence of carbolic acid, and you will also observe again redissolves in an excess of carbolic acid. None of these have undergone decomposition. I have also shown you capillary tubes filled with decomposed serum albumin (human), and gelatin and serum albumin (human), acted upon by various pathogenic and mouth bacteria, none of which show any sign of coagulating in the presence of carbolic acid.

After getting these uniform results by repeated experiments hundred of times and drawing my own deductions from them, I was naturally anxious to communicate with others who might have been over similar ground in search of other subjects. So I accordingly opened up a correspondence with Prof. Vaughn, of Ann Arbor, on the decomposition of albuminous substances and will give you his reply: "There can be no doubt that the end products of albumin decomposition are no longer coagulable."

Prof. Klebs, of world wide reputation, also states that they are no longer coagulable, as also does Prof. Hektoen, of the bacteriological and pathological laboratories of the Rush Medical College.

Before closing, I have to thank those gentlemen for their courtesy in answering my questions, and also to express my indebtedness to Mr. O. T. Roberg, of the chemical laboratory of the Rush Medical College for his valuable assistance in making the quantitative analyses of tooth substances.

The books I have consulted and freely quoted from are "Ptomaines, Toxins and Antitoxins," by Vaughn and Novy. "Microörganisms of the Human Mouth," Miller. McFarland's "Bacteriology." Sternberg's "Bacteriology." (Applause.)

DISCUSSION.

Dr. J. E. Hinkins, of Chicago: It is a special pleasure for me to have the honor of opening this discussion this afternoon, for several reasons. The first is that the essayist has been kind

enough to furnish me with a copy of his paper in ample time, that I might read it and re-read it and duplicate his experiments if I so desired. The second reason is that I have duplicated his experiments, which I did a year ago, and I also have done the same this year. And the best that I can do is to read what little I have done.

After reading the essayist's paper over carefully several times, the first thing that impressed me was the amount of work he had gone over in preparing his paper, and the second thought was, has his technique been good or has it been faulty? After a few visits to his laboratory and carefully watching his work I was favorably impressed with his methods. I found from my own observations from the laboratories of Prof. Long and Miller, that the technique of the essayist was up to date. Having satisfied myself so far, the next question was, can I duplicate his experiments and obtain the same results. Understand, if you please, I had no pet theories to prove or substantiate, but was looking and hunting for scientific facts only.

The first experiment I endeavored to duplicate was the analysis of the teeth, but I found after working at it a while that I did not possess the proper apparatus for conducting such an experiment, so I went to Prof. Long, of the Northwestern University, and paid him to make the analysis for albumin, which he did. He first duplicated the essayist's experiments, and then conducted some more experiments after his own methods, the result of which was that he found from $\frac{1}{1500}$ of one per cent to $\frac{1}{2600}$ of one per cent of albumin. He says that as the amount of albumin is so small in the teeth, the age of the patient and temperament of the person or persons that these teeth were taken from would make this difference in the per cent of the albumin found. There were sixteen teeth analyzed. So far as coagulating the different kinds of serum albumin in the capillary tubes and then redissolving it again in an excess of carbolic acid, I had no trouble in duplicating these experiments at all. It is a well-known fact in all bacteriological and pathological laboratories, that if pepsin is added to serum albumin and allowed to digest at body temperature, it is converted into peptonized substances, which are not coagulable.

As regards the time it takes carbolic acid to pass through the dentine of a tooth containing up to the time of procedure a normal pulp, it takes longer for carbolic acid to diffuse through the walls

of a tooth that has contained a normal pulp, than it does to diffuse through the walls of a tooth that has contained a putrescent pulp. I am inclined to believe that the longer the pulp has been dead in the tooth, the more porous are the dentinal tubuli, just like a tooth or a piece of bone that you have thrown away, see how soon it becomes porous; all the organic matter in the dentinal tubuli disappears. I have found that it takes 100 pounds atmospheric pressure to force ninety-five per cent carbolic acid through the walls of a tooth, just extracted, the pulp removed and pressure applied within five minutes from the time the tooth was extracted. The time required was one hour. The same pressure would force ninety-five per cent carbolic acid through the walls of a tooth which has been extracted for some months in a few minutes. Dr. G. W. Cook has gone over the same experiments and obtained the same results.

As to ptomaines: The essayist has quoted the best authorities, Vaughn and Novy, and according to their writings they give nothing very definite of the pathological effects which could be made applicable to the putrescent condition of the pulp, or chronic alveolar abscess, for these writers plainly state that they do not play any important part in diseased conditions in general.

The essayist has shown that in the decomposition of the pulp we do not have any insoluble albuminous substances; he has also proven that the end products of albumin decomposition are not coagulable.

Dr. J. G. Reid, of Chicago: I have been fortunate in being situated so closely to the gentleman who has read you such an excellent paper, and watching the results of his experiments, and the number of hours that he has put in to present such a paper as he presented to you, few of you know but little about. And this society is worthy of one of the highest compliments that could be paid to the essayist for contributing and making known some of the hidden secrets which we have been in ignorance of for a great many years; in fact, we never knew anything about them until this paper was presented. I think we can positively say that we have known that the coagulating agents would pass through dentine; we knew that last year; that was demonstrated conclusively; but we have never known why they did until this paper was presented here. This has been a mooted question for the last five or six years. It has been going the round of this country in literature,

and only recently has a paper been presented before the Ohio State Dental Society in which the essayist has said, "Who are we to believe?" One man gets up and says that a coagulating agent will not pass through dentine, another man gets up and says that it will. Gentlemen, I will ask you if, in the presence of these experiments, the question is not pretty nearly settled in your own minds why it does. There cannot be very much dispute about it; and if I had not heard any other paper, or never expected to hear any other paper, I have been amply repaid for coming to this meeting to listen to the paper which Dr. York has given us. I think that I owe it to this society to pay the very highest compliment to this gentleman for the service, and to know that it has come from the State of Illinois.

Dr. W. V-B. Ames, of Chicago: I am exceedingly pleased to have heard this paper in which I was very much interested. What strikes me most particularly is the very simplicity of this subject, after we get it presented in this way. What has been apparently such a difficult subject to get at, has, if I understand Dr. York's deductions, settled itself down to a very simple matter, and for that reason we are all the more indebted to him. If I understand it, it is simply a matter that fresh human serum albumin is coagulable, and is then dissolved in an excess of carbolic acid, but when decomposed the resulting compounds are not coagulable, there being no albumin. So, as I say, we are all the more indebted to Dr. York because he has given us such a simple elucidation of this matter.

Dr. Louis Ottofy, of Chicago: It is needless for me to add to what has been said by the essayist in an experimental way, but I want to draw the conclusions that naturally ought to be drawn from work of this kind, and I want to say a word in defense of the position held by Dr. Harlan on this question. Dr. Harlan has been drawn into this matter in a manner beyond anything that he ever expected, or anything that was just to him. As I remember it, the only contention that was ever made by him was that it was not a good thing to use carbolic acid in a tooth which has contained a putrescent pulp, the first time that the tooth has been opened, and after carefully listening to Dr. York's paper I believe that that position has been strengthened all the more. In saving a tooth after its pulp has been destroyed, the question is to make that tooth serviceable, and we see to-day any number of teeth that

have been treated by the old carbolic acid method, that are sore, the gums are blue and the teeth are useless. The use of carbolic acid in a tooth with a putrescent pulp the first time the tooth is opened —if it is true that it permeates the dentine more quickly than it does if it is introduced into a tooth from which the living pulp has just been taken—simply has this result, that it forces ahead of it the putrescent contents of the dentinal tubuli. This we will see in pericementitis. And again, certain irritations are brought about which are constantly kept up and for which there is apparently no cure. Therefore, Dr. Harlan is right in saying that carbolic acid should not be used, although he claims it is because he believes that it will not go into the dentinal tubuli. On the other hand, if the carbolic acid does go into the tubuli, all the more carbolic acid should not be used the first time, but some agent that has a tendency to draw out the contents of the tubuli first, and afterward the carbolic acid that can pass through, if you desire to get its effect.

Dr. Garrett Newkirk, of Chicago: I simply wish to express with others my satisfaction with the work of Dr. York. I am just now particularly interested in the operations of all English speaking peoples. I am especially delighted with the manifestations of sympathy that come to us from Canadian and English sources in this little difficulty that we are having with the Latin race. I have been delighted with some of the expressions that have reached us in Chicago from Canadian sources, and I look forward to that glorious time when there will be the disappearance of the old time spirit of hatred between England and America; when we and Canada and England will stand together; and here is a gentleman of English stock, born in South Africa, who has fought the Zulus, and who comes to us with an English addition to our American achievements.

Dr. Edmund Noyes, of Chicago: I would ask Dr. York whether his experiments indicated that carbolic acid would go through from the pulp chamber to the peridental membrane of the tooth.

Dr. York: I said that it would diffuse through dentine and not through cementum. The previous investigators said that it did not diffuse through the dentine.

Dr. Noyes: This has very important bearing upon the practicability of sealing carbolic acid into the pulp chamber of the

tooth, dead or alive. In my own thought in regard to this subject through all the past years, the objection to the use of carbolic acid in the root canals of pulpless teeth has related chiefly to its effect upon the apical space and the tissues in immediate contact with the apex of the root, rather than to its effect upon the tissues of the tooth or upon the contents of the pulp chamber and canals derived from the pulp. As I understand it, that which Dr. Harlan has laid most stress upon is the danger that in one of these cases of disease in which there is the exudation of serum from the apical space through the foramen of the tooth, and drainage in that way, it may be stopped by the coagulation of serum in the root canal or of the tissues in the apical space so as suddenly to stop necessary drainage and develop an acute abscess that might have been avoided by the use of a more diffusible and non-coagulating antiseptic or germicide. It seems to me that from that point and in that relation is the real and important question for the use of coagulants in pulpless teeth.

Dr. G. V. Black, of Jacksonville: I do not wish to enter into the general discussion of this paper further than to express my delight with the manner of presentation, for I like to see these more scientific phases of these subjects brought forward. We know more about it now that we did an hour ago, most of us, and we have knowledge coming to us in a way that is important and correct, apparently, to me, and that will stay with us as a landmark upon this subject. It does not affect as prominently as one might think the use or nonuse of carbolic acid in the pulp chambers of teeth, as I now see it. I think we need experiments in another direction yet to establish the usefulness or nonusefulness of carbolic acid in conditions which we may name in the roots of teeth. This line of work opens up many avenues for study. We are shown that we may use several disinfectants successfully in these places that under other conditions we could not. For instance, if we have an active suppuration occurring from an accidental infection after the pulp has been removed, we would be unable to use bichloride or mercury successfully because of the albumin present, but after the contents of the pulp chamber has become decomposed by microörganisms and the albumin removed, we may use bichloride of mercury successfully. And so the presentation of facts here opens up a whole field that we had not thought about before. Now, I would like to ask the essayist the

rate of the resolution of these different forms of albumin along the length of these tubes; for instance, how long does it take an inch of it to redissolve?

Dr. York: About ten days in a capillary tube.

Dr. Black: Suppose we had a quarter of an inch of albumin from serum drooling into the apex of the root, coagulated, and we had to wait for that proportionate length of time for it to redissolve, we will see that an abscess might cut up trouble in the apical space until we get through there again and get out that coagulated albumin, and so, while we have a whole lot of important news on the solution of albumin, we see that the original contention of Dr. Harlan was not far wrong.

Dr. York: In closing the discussion on my paper I would like to make a few remarks in regard to what Dr. Ottofy said. I am afraid Dr. Ottofy has put his foot into it. He states that in using carbolic acid there seems to him considerable danger of setting up an irritation. There is not any more danger of setting up an irritation at the apical space in using carbolic acid than there is in using anything else, unless you force it through. The trouble would not proceed from the carbolic acid; it would proceed from any poisonous matter that you might force through, therefore, you must not blame carbolic for imperfect manipulation. He also speaks of forcing the ptomaines through. Now, all ptomaines are not poisonous; some are, but the majority are not. All toxins are poisonous; that is why, if you open a number of putrescent pulps and you force substances in indiscriminately in five or six cases and you do not get a bad result, you become careless and you may do it the seventh time and happen to have a poisonous ptomaine. He talks about using the essential oils because the carbolic acid might force these poisonous matters through to the cementum. Carbolic acid will not penetrate farther than the cementum; it will cease there. If anything would carry these ptomaines through it would be an essential oil that would penetrate clear through the cementum. He also says he would prefer using an oil, as the oil would draw the poisonous matter out. I believe Dr. Ottofy is going to Tokio, Japan, and if he teaches these young dentists such lessons I am afraid the Mikado will send him back to Chicago as an unreliable man. An oil would not draw anything out; it simply displaces matter. If he wants to draw it out he should use a porous plaster, or something like that.

Dr. Black's expressions were the kind that would stimulate young men to do the kind of work that I have been doing, and coming from a man like Dr. Black, who has been over this field and can appreciate such work, I feel that his remarks are extremely kind and I appreciate them very much; and if some of the older men who have won laurels and occupy prominent positions in the dental profession would only encourage and stimulate the young men who have shown some slight abillty, instead of freezing them out when they come to these meetings, they would leave behind them men that would be capable of taking the place of such men as Dr. Black when they retire from active service.

I would also like to correct a statement that Dr. Black made. He asked me how long it took to coagulate the albumin in those capillary tubes, and I told him about ten days; and then he said that he thought if it took ten days to redissolve this matter that an abscess might cause a lot of trouble. You will not find coagulable matter in the contents of a putrescent pulp canal. It was albumin that was not decomposed that was coagulated. And again, this would not coagulate in the apical foramen, because you will find that when you put oil, or carbolic acid or anything through into the apical space you have got to force it through. You need not be afraid of it causing any trouble there.

I do not know that I have anything further to say than to thank you all for the kind manner in which you have received my paper.

WHERE SHALL I LOCATE, OR THE BEAUTIES OF A COUNTRY PRACTICE.

By Dr. James W. Cormany, Mt. Carroll, Ill.

In presenting this subject for your consideration I am actuated by a desire to direct the thought of the profession for the time at least to something different from dental caries, new appliances, etc., and will leave others better qualified than I to tell you of teeth, their troubles and repair.

Where shall I locate comes up in the mind of every one who chooses the dental profession for an avocation, and as he runs it over in his mind from time to time the place that bobs up serenely from below is the city, the city. Of course, all that are here are located, or dislocated, and I wish to show up a few points in favor of the country, so when you are consulted as to the place to locate you will think on these things I am about to tell you. In the first place I wish to disabuse your minds of the oft repeated assertion "that there are no advantages in the small town for the professional man." Let me call your attention to the fact that nearly every town of 1,000 inhabitants or over has a system of water works, electric lights, well paved business streets, a railroad either on the main line or a branch, and the people that live in these towns are educated nowadays, and the majority of them own their own houses, and don't you think for a minute that they are not posted on the ways of the world and the news of the day. (Laughter.)

These towns, as a rule, are located in a rich farming district, and the farmers, if you please, demand the same skilled operator and as perfect work as the city people, and do not foolish yourselves into the idea that they do not know the difference.

They are well posted on the teeth without plates, gold crowns, porcelain faced and all porcelain crowns, suspension bridges and everything pertaining to dentistry.

You have the same office hours as you have in the city, and you are the city dentist practicing in the country. Let me also

take that little thought out of your mind, that "country people only want false teeth." They have been taught different in my locality, and it's save every tooth you possibly can.

Did you ever stop to consider what the farmer supplies? Listen! The merchant, the professional man, the man of leisure, the railroads, the colleges, not only with food, but men and women. Let us strip the idea of all selfishness and look at the subject from the right standpoint. Health, the first desideratum devoutly to be wished, and where does the seeker for this boon go but to the country. It is here the boys and girls are born and brought up to supply the demand of the large cities. It is said it takes 300,000 boys every year to supply the city of London alone, for the city boy is not to be preferred to the short, sturdy country lad full of life and vigor, and it is these you get the first chance at and get these teeth while they are good and strong and before the ravages of decay, produced by poor food and impure milk, has had its deadly effect upon them, and the cry goes up, God give us men with good teeth.

THE DAY'S DEMAND.

God give us men! A time like this demands
Strong minds, great hearts, true faith and ready hands;
Men whom the lust of office does not kill;
Men whom the spoils of office cannot buy;
Men who possess opinions and a will;
Men who have honor; men who will not lie;
Men who can stand before a demagogue
And damn his treacherous flatteries without winking;
Tall men, sun-crowned, who live above the fog
In public duty and in private thinking.
For while the rabble, with their thumb-worn creeds,
Their large professions and their little deeds,
Mingle in selfish strife, lo! Freedom weeps,
Wrong rules the land, and waiting Justice sleeps.

—*J. G. Holland.*

Twenty-one years ago a pale, thin, cadaverous individual, weight about 120 pounds, went to the city of Chicago with the idea perhaps of locating there, and before coming to a decision thought to consult an old time friend then in practice in the city, and this was his advice: "Go back to the country, the city is a poor place, and if I had my life to live over again, there would I be and my word for it you will never regret the step." He acted upon that suggestion and he now stands before you, weight 190 pounds, a

physical organization and a digestive system equal to any and not kept up with the use of drugs, and he has enjoyed a practice and a life which would make many a city dentist turn green with envy, an office equipped with all the modern conveniences, improvements and appliances, motors run by water for dental engine, mallet and fan, the electric current for porcelain work, a window in the operating room 4 feet by 8, and not 300 feet in the air in order to get sufficient light not obstructed by buildings on the other side of the street. (Laughter.) What matter is $20,000 a year, and I never believed it, and it takes $19,500 to live, when a practice in the country nets the same clear income? The question of profits are relative.

I do not wish to be understood as discouraging education, but so many boys are educated far beyond the limits of their usefulness. The sons of the wealthy are brought up in idleness and then sent to college, some seven, some eight years, and after this what? The profession of dentistry. Spending from three to five years at a dental school, and when the time comes for waiting patiently for practice he will not do it. Why? Self-denial he has never practiced, and the consequences are a good merchant or mechanic has been ruined. A boy should be taught "to labor and to wait," and the proper use of money, whether he has plenty or not; and made to earn at least a little before he reaches to the age of twenty-one years, and after that is plenty of time to prepare for the practice of dentistry or any other profession, and when he has finished he is a man full grown and with sound judgment. Such an one you will find in the country practice, and he is the one that makes the best all around dentist; and in the country town is where he is wanted, and it is there he does the most good to the greatest number, and of very much good to the community in which he lives.

There are so many things a dentist can enjoy in the country town. Let me enumerate a few. He can serve his people as mayor or alderman, a member of the school board cr board of health, he can deliver the fourth of July oration, and his oration will be of the practical, patriotic sort that goes right home to the hearts of his people, and they will believe him for he is known among them for truth, veracity; his oration will be published in his home paper, and for the time being he is a bigger man than the president of these United States.

I have always maintained that ministers should preach what

they were commanded to do, namely, "the gospel" pure and simple and nothing else. And I, too, want to hold to my text and show you all the beauties of a county practice; and a country citizen where he is a man among men, and matters not be he rich or poor, he is rated for his sterling character, and honored among his associates. I live in a country town, so-called, and have lived there for twenty-five years in the practice of dentistry, and I know what I am talking about. Young man, do not be deceived, "it is not all gold that glitters;" that it is only the country dentist that makes false teeth, uses amalgam and fills teeth with cements only, and root canals with cotton and iodoform. I have lived long enough to know to the contrary, and when the city dentist stands up at society meetings and tells only of the fine gold contour fillings (and nothing else) they make, and always use the rubber dam, take it in with a great deal of allowance.

Do not believe that the State societies are composed of only dentists from the city. Quite a goodly number are from the country towns, and more in proportion to the number from the city.

We may not show up with the latest cut in clothing, but we dress comfortably and will average up with the best of them. We have the health, the bounding pulse, the fresh blood, the firm muscle and quick nerve. "Is not the life more than meat and the body than raiment?" (Laughter and applause.)

We stand for something there and can be somebody. We get reasonable prices for our work and throw our whole soul into our business, not for mere dollars and cents; keep a complete set of records and do business on just as strict business principles as any place.

We have but one life to live and one country to love, and I prefer to practice and live among God's green hills or rolling prairies, where we can see the sun shine by day and the moon by night, than simply exist in the city surrounded by brick and mortar. (Applause.)

DISCUSSION.

Dr. C. N. JOHNSON, of Chicago: I think I can detect in this paper evidences that the essayist has taken the first move toward locating in the city. Somebody who heard that paper even made the charge that he was thereby advertising his practice for sale. (Laughter.)

Now, there are two sides to this picture; we have had one of them, and I agree with a great many of the things that the essayist has said, but he has only brought the one side to the front. It so happens that I have had some experience in a country practice as well as in the city, and I want to report some of my experience in the country. I admit all of the glories that he has advanced, every one of them, but there were some annoyances about a country practice that he has not touched upon. He has not said one word about a certain individual that we all know; he has loyally and manfully kept that individual in the rear. I refer to "Mrs. Grundy." My experience in a country practice was this—that Mrs. Grundy knew more about my affairs than I did myself, and she took the pains to advertise them. And I do want to say, in all seriousness, that this one little thing of gossip must be recognized as an element of discomfort, at least, in a country practice. You do not encounter that same degree of irritating, petty gossip in the city that you do in the country. Now, there is one thing that the essayist said, however, with which I want to agree, and I believe it to be the impression that it is not true, but I want to say that the average country practitioner has a better means of informing himself on general topics than does the city practitioner. It is his province to come in contact with literary societies. He meets thinking men and women, and it is the tendency in the country towns of to-day to encourage that kind of advancement and investigation, and I say that, other things being equal, the country practitioner should be better informed than the city practitioner. In the city there is the one eternal grind from one month to another, and from year to year, with little opportunity for personal cultivation.

There was one thing he spoke about in regard to health, and cited himself as a good example. Now, that does not count for anything. A man of the marked individuality of Cormany, no matter where he practiced, would advance in honor and adipose,

and I have not the slightest doubt but what if he had lived in Chicago he would weigh 290 instead of 190 pounds. (Laughter.)

There is another thing in regard to municipal honor that is true. A man in the country may be a representative man, and I wish here to take this occasion to refer to the fact that we have the honor to have in our own society a gentleman who is a country practitioner and who has also served his State in an honored position in the legislature. I refer to Dr. E. K. Blair.

Personally I am a great lover of nature, and I must confess that it is a recreation for me to leave the city and get out into the country, to get away from the humdrum of city life. It is a recreation to be out some place where you are awakened in the morning by the song of birds, and where the sunlight peeps in behind the shutters. And when you start down town in the morning every person you meet knows you, and you have a close interest in each other which inhabitants in the city cannot possibly have. I do not mean that the city practitioner loses his individuality entirely, but it is a fact that we see so many strange faces in the city that we do not have such a close community of feeling with our fellow men as in the country. And then it seems to me to be ideal to put in a day of that kind and go home in the evening and sit out on the veranda (and I would not think of having a country home without a veranda), and then go up to your chamber and be sung to sleep by the lullaby of the winds through the branches waving at the window.

Dr. E. H. Allen, of Freeport: I live in the country also; I am not going to say anything about my health, but Dr. Cormany told me a story about a firm of Jews who were bankers, and they failed; the creditors assembled to see what there was left in the wreck and to divide up the property, and one of them, having first choice said that he wanted the *gall*. I think that Dr. Cormany has gotten somebody's gall to get up and hold himself up as an example of health. Why, he is all bleached out. I sat beside him several times at meals and he always called for a cup of hot water. (Laughter.) Only a couple of years ago he was in Chicago and he got sick there, and, good gracious, he had an awful time, and he was always taking out a little bottle of sugar coated pills and taking a few—

Dr. Cormany: Stick to the truth.

Dr. Allen: The rest of the country part is all right. I have had the city fever myself, and I think I like the country. I have my chickens, and we used to have a cow and we had cream to give to the birds—laughter—and as Dr. Johnson said, I feel that social part of the country town; we have our personal friends and we pretty nearly know all that is going on in the town; there is not anything that turns up in Freeport in the morning but what it is all over town in the evening. And another thing, I would a great deal rather be a big toad in the Freeport puddle than a little toad in the Chicago puddle.

Dr. Cormany, (closing discussion): I do not care to say anything more about it. The object of the paper has been accomplished, and I thank you all for your kind consideration of it.

A NEW PROCESS OF FUSING PLATINUM.

L. E. Custer, B. S., D. D. S., Dayton, O.

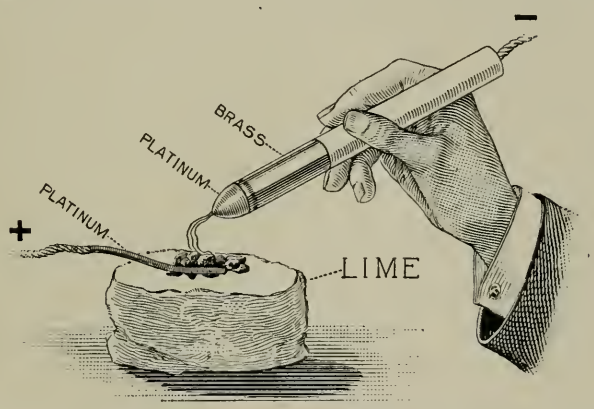
The utilization of the dentist's scrap platinum is an important item in the laboratory. In 1893 I described a new process for fusing platinum whereby the dentist with the Edison current could melt his own platinum scraps. This consisted of a carbon block upon which the platinum is placed, forming one terminal of an electric current, and an arc light carbon forming the other. Upon touching the platinum with the carbon pencil the circuit is closed and the current is established. Upon raising the pencil a short distance the current appears in the form of an electric arc between the carbon pencil and the platinum.

When an electric current meets with resistance to its flow it produces heat proportionate to the resistance of the conductor. It is the resistance offered by the carbon filament that causes the heat and light of the incandescent lamp. The atmosphere is practically a nonconductor of electricity, and yet under certain circumstances it allows the passage of an electric current through it. When two live terminals are brought together a current immediately flows across the junction. If now the terminals be slightly separated the electric current is not broken thereby, but continues to flow across the break in its path in the form of the electric arc. At the air space the resistance is so great that the current appears in the form of heat and light. The heat of the electric arc is estimated at 6,000 degrees F., which when properly manipulated, will fuse platinum.

The platinum which was fused upon a carbon block by means of the carbon pencil as previously described, is given a property of stiffness not possessed by new platinum. The platinum evidently takes up some of the carbon by which it is effected in a manner similar to the addition of carbon to soft iron, it does not effect the melting point of the platinum, but produces an ingot which possesses all the characteristics of platino iridium. The per

cent of carbon which the platinum takes up is proportionate to the length of time it is manipulated in a molden state in the presence of carbon. If the scrap can be melted together at a single striking of the arc it takes up so little carbon as not to be noticeable in the working of the ingot, and it will be soft as new platinum, but where a large quantity is fused it requires more or less time to gather the scraps into one piece, and it then takes up carbon and becomes hard, somewhat proportionate to the length of time it is manipulated in the presence of carbon.

The platinum which is melted by the carbon terminals is useful for many purposes, and this stiffness is a very great advantage. It answers for backings and makes the very best of pins for anchor-



ing fillings with, for crown posts and for regulating appliances, and is of especial value for the frame work for porcelain bridges and continuous gum.

When it is desired to melt the platinum and at the same time retain its ductility, another method must be employed. It is this that is new. The electric arc is still employed in a manner precisely the same as for hard platinum, but instead of using carbon terminals I now employ a block of lime for resting the platinum upon which forms one terminal and a platinum pointed metal pencil for the other terminal.

The block of lime is merely a receptacle for placing the platinum scrap upon. It will withstand the heat of the arc when used in this manner and does not affect the platinum. The electrical connections are different from those where carbon is employed. Lime is not a conductor of electricity, so instead of attaching one

wire to the lime as to the carbon, electrical connection is made by having one of the electrodes terminate in a short piece of heavy platinum wire, which rests upon the block of lime, and upon which the platinum scraps are heaped.

The other terminal and the one which is used in the hand is a rod of brass half an inch or so in diameter and four inches long mounted in a wooden handle. The rod is tipped with a solid nugget of platinum the size of a thimble.

The object in having such a large piece of metal is that it conducts heat off from the platinum tip to that extent that the tip does not melt and unite with the scrap.

It will be noticed that by the above arrangement and as shown in the cut that the platinum scrap comes only in contact with the platinum tip and the block of lime while fusing. It cannot become contaminated by the tip, as that also is platinum, and since the lime is not decomposed by the heat the metal is not affected by its presence. Platinum fused in this manner is as soft and ductile as new platinum and may be rolled or drawn into a wire as easily as new.

Every dentist who has the Edison, or 110 volt current can fuse his own scrap in this way. All that is necessary in addition to the block of lime and platinum tipped pencil is a resistance equal to about 10 or 15 ohms. Five pounds of No. 19 copper wire wound on slate (school slates) and properly mounted so as to ventilate will give this. Or, an electric oven will answer just as well if disconnected from the rheostat.

In order to get the best results it is important to make the connections proper as to the poles. It is found that the positive pole of an arc is much better than the negative, consequently the scrap platinum should be the positive and the pencil the negative pole. If the pencil should be positive, unless it is a very large piece of metal, it would melt before the scrap, whereas, if the scrap be made the positive pole it melts before the pencil has even become warm.

While not more than half an ounce can be melted at once with the above described resistance, there is no limit to amount of platinum that can be gotten together in one mass with a larger arc by a process of fusing too. It is not necessary to have the whole mass in a fluid state at once, a part may be melted and new metal added.

DISCUSSION.

Dr. W. V-B. Ames, of Chicago: I do not propose to occupy more than a minute on the discussion of this paper. Dr. Custer has given all the details of the operation, and there is practically nothing to say. I had, since his first presentation of this method, tried it, and found, naturally, the difficulty he mentions, hardening of the platinum, so I appreciate the advantage of using this calcium block; and all that I have to say is that in my own experience with it the difficulty that I would want to overcome would be to have some fixed apparatus by which I could overcome the tendency of breaking the arc from my own unsteady hand. In having to make the connection so often I would not progress so rapidly as if I had a fixed apparatus to hold it right where it belonged. It seems to me the ideal apparatus would be a calcium block into which the negative pole was molded. Take a cupel mold into which bone ash cupels are molded and fix a platinum point which would come to about the surface of the concavity and mold into this either bone ash or calcium oxide; then if the pencil was in a frame which was adjustable, by which it could be brought down to a certain distance from the platinum mass, and arranged with a spring by which the pencil could be brought into contact with it and there held at just a given distance, you would then not only have that rigid, but you would have both hands to handle your work.

Mr. Lob, of Chicago: With reference to Dr. Custer's paper and the remarks Dr. Ames made, I will say that I have constructed some time ago an apparatus such as Dr. Ames described. The carbon pencil forming the negative pole is fastened to a rack and pinion movement, which allows a gradual sliding up and down. This arrangement works very nicely, and allows a perfect regulation of the arc just as it may be required and leaves the other hand free for manipulation.

I have my doubts that in fusing platinum under an arc the contact of the metal with carbon will make the platinum hard. I have spent a good deal of study in metallurgy, and I do not know if the addition of carbon to platinum during the fusing process will alone be the reason for making the platinum hard. I think there are other elements which are the cause of this. I am not prepared at present to give any details on this matter, but I think if Dr. Custer is willing to investigate it a little further he will find that

the presence of very small amounts of other metals, such as wolfram, may have something to do with it.

Dr. Custer: I have just a word to say. The suggestions as to detail as made by Dr. Ames are all very good, but what are you going to do with your hands when you have arranged it in that way? That which I have presented is the simpler way, and you will find in the practical working of it that it is necessary to manipulate that arc in order that you may melt the metal in the shape that you want it. That is the advantage of manipulating one terminal with the hand.

I am pretty well satisfied in my own mind that it is the taking up of carbon that produces the hardening. I was some time ago in correspondence with Baker & Co., and they said that in all of their refining they were careful to keep carbon away from platinum. We have nothing present in the old method but carbon, the carbon block and the carbon pencil, and it seems that nothing else could be taken into the platinum but carbon.

NEW METHODS AND APPLIANCES IN ORTHODONTIA.

By C. S. Case, D. D. S., M. D., Chicago, Ill.

The demands of a practice that is limited to dental orthopedy and the construction of artificial vela has led to the invention and practical application of so many ways and methods that are distinctively individual, that I am able to say to-day that everything in my practice covering every variety of movement of malposed teeth from the very beginning, where the material in the rough is worked into stock regulating material and implements to the final retaining appliances, is characterized by personal ways and means.

I do not wish to be understood as implying by this that I have not been dependent upon the thought and skill of other men—to whom I shall always feel grateful—for that foundation which has enabled me to build this system of practice. To Dr. Edward H. Angle I am principally indebted. In fact, it was by following his method, at first, of constructing regulating implements and finally seeing the almost unlimited opportunities presented by building a regulating apparatus upon bands cemented to the teeth, that led me to specialize my practice to this branch of dentistry.

To Dr. Norman W. Kingsley I am indebted for the foundation to my system of constructing artificial vela.

And so we are all indebted to other men—to some more than others—for the foundation of everything we know or accomplish. There is no year I teach, that I do not learn practical truths and often important ones, from students who have had no experience whatever. But it is almost entirely through the influence of our societies, our system of disseminating truth, scattering our best thoughts freely to the world, our interdependence one upon the other, our desire and ability to appropriate, use and individualize whatever comes to us of value from whatever source, that we are able to say to-day with pride that we are members of a great and progressive dental profession.

I have come to believe moreover that the success of a dentist is not so much dependent upon his knowledge of what is under-

stood as the principal and specific methods of practice, as it is upon his ingenuity and ability to individualize these principles according to immediate needs with variations that are indispensible to the real perfection of the operation in hand, and which may be thought of at the time—if given any thought at all—as moves that are so slight and unimportant that they are hardly worth speaking about.

That is especially true in the practice of orthodontia. No apparatus that was ever constructed, however simple and apparently efficient for the purpose to which it is designed, will correct that irregularity without frequent and intelligent variations to its principal action—such as the tying of a ligature here or there, or the immediate removal of a band or a part of the apparatus and the application of other bands with different attachments that will

Fig. 1.

make it possible to slightly change the direction or quality of force upon some particular tooth or teeth. Because of this fact many of the appliances I have invented and published the construction and action of, to the minutest detail, describing and presenting models of case after case where they have performed even marvelous results in my practice, have not so far as I can learn met with similar success in the hands of others.

When our methods of teaching in this department become as perfectly developed as in other branches of dentistry, when a thorough knowledge of the simple laws of mechanics is insisted upon as one of the preliminary college requirements and every branch of dentistry that is dependent upon mechanical and manipulative skill is taught scientifically as in all other professions and trades that are dependent more or less upon a practical knowledge of the principles of force, then, and perhaps not until then, with

the coming generation of dentists, will orthodontia take its proper place in dentistry.

With this preface to my paper I will proceed to describe as briefly as possible some of the new methods and regulating apparatus that I wish to present at this meeting.

Class I. The expansion of the lower dental arch.

Several years ago, wishing to avoid the use of plates and springs and substitute the far more desirable positive force of a screw, I conceived the idea of soldering to the ends of a tube that would rest just back of the incisor teeth right and left cut nuts. From these extended inflexible arms that were bent back nearly at right angles as they emerged from the prepared tube and rested upon the lingual surfaces of the teeth to be moved, the expansion being brought about by turning the entire tube with a wrench that engaged with one or the other nut. The difficulty of obtaining, in this method of construction, the necessary absolute

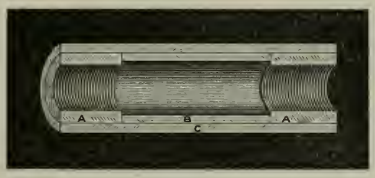


Fig. 2.

correctness in the line of the two screws within the tubes, led to the very useful and effective apparatus shown in Fig. 1, which was presented at a meeting of this society in 1894 and published in the August Dental Review.

Fig. 2 shows enlarged section of the expanding tube. It will be seen that it is made of three tubes. The smallest, a. a., of 24 g. plate drawn to an internal diameter proper for required screw; b. of 28 g. plate drawn in same hole as a., and c. of 28 g. plate drawn to an internal diameter equal to the external diameter of a. and b.

When these tubes are cut proper lengths, fitted and soldered together, the end pieces are threaded in right and left cut taps, which are made with right and left Martin screw plates, and in the same holes used for threading the mesial ends of the arms. The prepared tube is then partially squared at the ends and in such a manner to allow the wrench to grasp it at every eighth turn, as shown in Fig. 1.

While this expander will probably always hold an important place in my practice, I have been using of late another form which is quite as effective in most cases and much easier to construct. See Fig. 3.

A German silver wire should be selected for the lingual bow of sufficient size (B. and S. g. No. 14) to perform its work at the distal ends without bending. That portion which rests back of the incisors is filed flat to about one-third or one-fourth of its diameter in thickness.

In the process of soldering the rests for the jack-screw as shown in Fig. 3, the temper is removed from the flattened portion so that it can be easily bent. It will be seen that the expan-

Fig. 3.

sion of the anterior portions of the arch will be in proportion to the amount of curvature given to the flattened part. For instance, when the flattened part has come to a straight line by the outward pressure of the jack, or has been made straight in the first place, as shown by A, Fig. 3, no further expansion can occur between these points. The entire power will then be directed to the expansion of the distal portion of the arms.

Class II. One of the most common forms of irregularity is in those cases where the proper eruption of the cuspids has been retarded or prevented for the want of room. When this is due to the premature extraction of the deciduous cuspids the space will frequently be entirely closed by the adjoining permanent teeth. When this occurs upon one side only the crowns of the incisor teeth

will often be found to stand at a decided lateral inclination, as in Fig. 4. An apparatus that is admirably adapted for the correction of this form of irregularity is shown in Fig. 5.

The object to be obtained is to force the bicuspids and incisors back to their proper relative positions sufficiently to give room for the cuspid and at the same time produce a symmetrical arch.

"A," Fig. 5, shows detached movable bicuspid anchorage appliance. The distal ends of the power tubes are supported and freely move in troughs, made of open tubes, soldered to the molar. This permits a free relative motion to the bicuspids and molar. The tubes are attached to the bicuspid bands by means of intervening short sections of tubes soldered to the bucco-distal surfaces.

The object of this method of attachment is two-fold. First, it forms a firm attachment to the band and brings the strain at a point

FIG. 4.

that will have the least tendency to rotate the bicuspid, a feature that is especially important when power is to be used upon one side only. Second, it permits of sufficient room for the action and turning of the nut.

In this paper, in speaking of the sizes of the several wires used I shall denominate them according to the hole in which they are threaded in the Martin screw plate.

"B" is a No. 10 or 11 alignment wire; "C" is a short section of tube slipped on to the wire and soft soldered (so as not to take out the temper of the wire) at a point to engage with a similar tube "C" soldered to the lateral band, with the joint outward so that it can be opened in placing the wire and finally closed around it. Thence the wire passes along the labial and buccal surfaces of the teeth as an alignment wire and into an anchorage tube on the opposite molar, where it is usually threaded to carry a nut at each end of the tube. By applying power at the nut "D" it exerts a recip-

rocating jack force to open the space required, while the tautness of the alignment portion of the wire can be accurately controlled by the two nuts at the molar tube. Instances will arise when it will be desirable to exert a traction force at this point. Again, it can be made to act as a spring bow to which the incisors may be ligated, to enlarge the incisal arch. When the cuspid space is only partially closed this apparatus, without the lingual portion, will answer every purpose. When the eruption of both cuspids is prevented, as in Fig. 6, the movable bicuspid anchorage can be duplicated on both sides. In cases where the cuspid spaces have

Fig. 5.

become entirely closed and more power is required, the lingual jack can be added in the construction, as shown in Fig. 5.

Fig. 7 shows a variation of the apparatus demanded by slightly changed conditions.

Class III.—With many upper abnormal protrusions the bite is so short that the lower incisors strike the upper gums back of the incisor ridge, making it impossible to reduce the protrusion until this feature of the condition is corrected. Fig. 8 correctly represents a section of the models of a case in practice.

Several years ago I invented and published the very effective apparatus for opening the bite, shown in Fig. 9. The incisor and bicuspid bands are .003 of an inch thick. The hooks, which are wide and smoothly polished, where they come in contact with

the mucous membrane, are soldered to upper edge of the incisor bands and turned up, and to the lower edge of the bicuspid bands and turned down.

Shell crowns are made for the first molars as follows: Bands .004 of an inch thick are first made in the usual manner and contoured to fit; the upper edges beveled and burnished to the irregularities. Then an impression in Teague's compound is taken of each separately, the bands removed, placed in impression, which is then dried and filled with Mellote's or Babbitt's metal. This gives you a die or metal tooth with band in place, with which an occlusal cap of 28 g. plate is swaged, band removed and soldered, which when finished and gold plated, all made in short order, has the same appearance as any perfect gold shell crown, and one which you may be sure will accurately fit the molar for which it is designed.

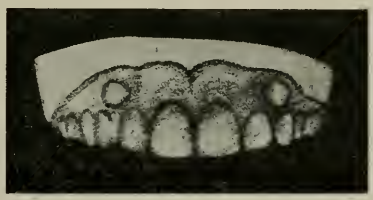


Fig. 6.

While soldering the caps also solder open tubes (turned up) to the buccal surfaces. The tubes should take the direction of the alignment wire. When apparatus is ready to be attached, cement the first day, bicuspid bands only, to insure their not being pulled off in placing the wire.

At the next sitting the balance of the bands and the crowns are cemented. In placing the spring alignment wire, after cutting it the proper length, place one end in the open tube of a molar, then spring it down under the bicuspid hooks, up and over the incisor hooks, down under other bicuspid hooks, and finally up into the other molar tube, after which bend all the hooks and tubes in closely upon the wire and polish off rough or projecting edges. I have not for years used piano wire or any form of steel in a regulating appliance for many reasons. A German silver wire drawn

without annealing from No. 10 B. and S. g. to the desired size is sufficiently effective for every purpose.

The first wire attached may be as small as No. 13 M., which in a few weeks can be changed for a No. 12 M. I never use any

Fig. 7.

larger. This apparatus is the most practically effective that can be imagined, is not difficult to construct, after the first week requires little attention, and gives no discomfort to the patient.

The necessity of at first masticating upon the molar crowns only is perhaps the most unpleasant feature, but the bicuspids and second molars, if the latter have erupted, soon raise to an occlu-

Fig. 8.

sion; at the same time the incisors are gradually intruded. Usually in two months' time the case is ready for the apparatus to reduce the upper protrusion.

My object in again bringing this apparatus to your notice is to introduce an important variation to it that has not been published.

It applies to cases similar to Figs. 10 and 11, which represent different views of the same case.

I think it will be seen that the real difficulty in retruding the uppers would arise from the same character of occlusion of the lower incisors as in the former type of irregularity. And that the former apparatus would not force the incisors forward—as well as

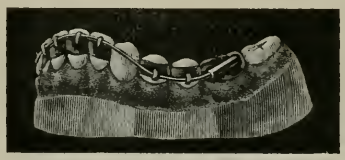


Fig. 9.

down—to make room for the eruption of the cuspids, or tend to raise the cuspids to place.

In fact, that apparatus as described would tend to crowd the cuspids further out of place and make their eruption more impossible.

Fig. 12 represents the variation which I used for this and similar cases.

Below the molar open tubes, are soldered closed tubes for a

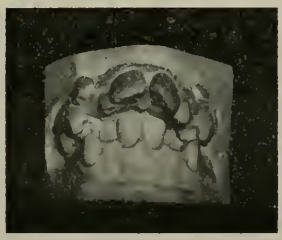


Fig. 10.

No. 10 M. alignment wire. The cuspids are banded and carry short tubes open labially that are finally closed upon the No. 10 wire, the ends of which rest in the lower molar tubes. If the cuspids need to be retruded the ends of the wire should be threaded for nuts. Other than this, the balance of the apparatus is the same as shown in Fig. 9. The lower wire is placed in position and rubber bands cut from the smallest regulating tubing are car-

ried from the incisor hooks under the wire and back. These will tend to force the incisors forward as well as down and lift the cuspids into place. As early as practicable, on account of the position of the cuspids, the upper wire can be placed as described.

Class IV. The next apparatus to which I wish to call your attention is for properly closing the space after the extraction of one of the lower incisors.

Fig. 11.

In a crowded and overlapping condition of the lower incisors where the arch should not be enlarged, and where it should not be retracted as much as would be required by extracting a bicuspid in each side, the extraction of an incisor is indicated.

When this has been decided upon, the next important consideration is: which one to extract. If they are equally healthy, their position should be a guide, with a slight favoring toward a central as it occupies less room, and the result more symmetrical.

Fig. 12.

One who is not versed in the proper method of determining this important question will be very apt to extract the wrong tooth, because it is the most irregular or thrown furthest out of alignment, and one if extracted often leaves a condition that is most difficult to properly correct.

In the treatment it is not sufficient merely to bring the crowns to alignment, or rotate them if necessary, and close the space by

drawing them together, but it is equally important that the roots of the teeth adjoining the space should be near enough together to leave no marked depression at this point, or wide interproximate opening. The rule, therefore, that should guide, outside the question of disease is: Extract that tooth between adjoining teeth whose position indicates that the apical ends of their roots will require

Fig. 13.

the least movement in the process of correction, and this *regardless of the irregularity.*

When a lower incisor is crowded completely out of alignment the incisal ends of the adjoining crowns are gradually forced toward each other; and when this has been going on for some time the irregular tooth will act as a fulcrum, with a tendency to force the

Fig. 14.

roots in the opposite direction. At any rate, it is a fact that the most irregular tooth is rarely the one to extract on account of this decided inclination of the adjoining teeth, making it necessary to move the roots so far.

I can well illustrate this by a case that recently came to me. (See Fig. 13.) The crown of the left lateral was crowded out and

stood well in front of the cuspid, the space being more than two-thirds closed. I decided rightly to extract the left central and tip the lateral back into the opening, which with a slight movement of the right incisors would have corrected the case easily without resort to the apparatus for moving the roots, (which I will describe).

By an unhappy inadvertence I marked on the extractor's

Fig. 15.

card the lateral instead of the central. When the patient came back I saw the error, and immediately rushed to the operator, and gave him a little talk about being more careful. He politely showed me the card and my own mistake. Said he, " Doctor, I had great difficulty in extracting that tooth on account of the narrow space for the lingual beak of my forceps, but it certainly seemed

Fig. 16.

to me to be the right tooth to extract." And that I venture to say would have been the common but most wrongful verdict.

Fig. 14 shows correctly the position of the teeth after extracting. One can see at once, though far more perfectly by the mouth, that the roots of the left central and cuspid will now require considerable movement to correct the very condition we would wish to avoid.

Fig. 15 shows position of teeth had the central been extracted. The space would have been wider, but the condition very much easier to correct.

It will be necessary for me to move the roots of both centrals and cuspid toward the space.

Fig. 16 shows the front view of the apparatus that was made

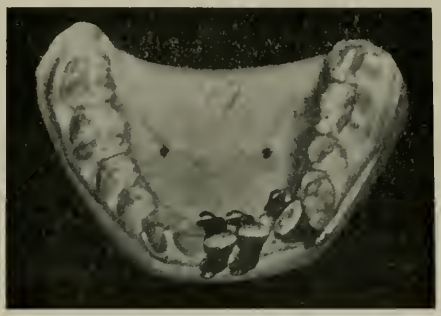


Fig 17.

for this case. Commonly it is necessary to move the roots of only the two teeth adjoining the space. Bands .005 inch thick extend from the incisal to the gingival margins. To the labial and lingual surfaces of these are soldered club shaped pieces of 28 g.

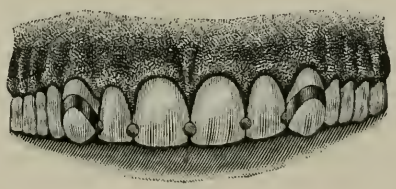


Fig. 18.

plate, extending down over the gum and carrying hooks to which are attached rubber bands that extend across the space from one to the other. See Fig. 17.

By this method the force is applied well down upon the roots of the teeth. Any amount of force necessary can be employed, and because of the lingual and labial attachments the teeth are

prevented from rotating, or, if required, can be made to rotate either way.

Class V. If there is one thing more than another that has prevented the operation of regulating teeth from becoming established as a part of the regular practice of dentists in general, it is the discouraging difficulties and frequent failures that have attended the final retention of the teeth in their regulated positions.

The many ingenious appliances and methods for regulating teeth that have been introduced have enabled almost every dentist, who has made the attempt, to greatly improve if not fully correct the positions of malposed teeth.

Up to this stage it has been one of the most satisfactory operations in dentistry, and yet one unfortunately that has so often been followed with failure, through the tendency of the teeth,

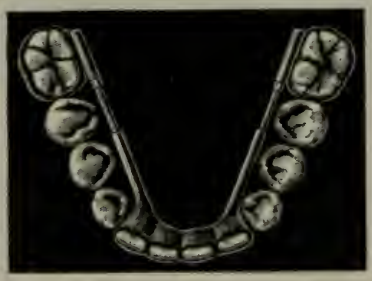


Fig. 19.

under the forceful influences of inheritance or otherwise, to return to their former positions that many skillful dentists have abandoned the operation of regulating teeth altogether, while others will only attempt the simplest cases or those which can be brought to a position of self-retention.

I shall not attempt in this paper to go into the causes which operate to produce this tendency of the teeth, nor give my opinion in detail of the imperfection and inadequacy of retaining implements that have been and are still being used. There are, however, a few underlying principles that should be borne in mind. First. Teeth that are moved by orthopedic processes from one relative position to another are for a considerable time—often for years—surrounded by physical forces that tend to pull or push them back to the irregular position they formerly occupied. Second. These forces continue to operate until the tissues are

brought to equilibrium in their changed positions by the physiological processes of nature. Third. To most successfully aid nature in the upbuilding of sustaining elements and structures, the moved and loosened teeth should be held absolutely still during the entire period that is required for their permanent retention. The retaining appliance should be one that so firmly grasps the teeth that the aforesaid forces are not only completely held at bay, but the slight movements occasioned by mastication and otherwise are prevented. It should be one, moreover, that frequent removals for cleansings, etc., will be unnecessary and impossible.

It should therefore be as perfectly fitted, finished and cemented as a bridge denture, and so constructed that the teeth and gums can be kept in a healthy condition while it is worn with the same comfort and unconsciousness that a filling or crown produces.

Fig. 20.

To fulfill all these demands, its appearance in the mouth is of the utmost importance. Patients and friends of patients will submit to long, tedious and painful operations with cumbersome and unsightly apparatus, stimulated by the hope of ultimate success, but when the teeth are finally brought to a satisfactory position an all-round fight begins for the too early removal of every reminder of the unhappy ordeal through which they have passed. This often comes most forcibly through the influence of sympathizing friends and relatives, especially if the retaining appliance is at all unsightly or produces discomfort to the patient.

As these difficulties and demands apply particularly to the anterior teeth, an apparatus that has been used with the greatest satisfaction in my practice for the past two years and which has been developed during this time to its present stage of seeming perfection is shown in Fig. 18. A full description of its construc-

tion in every detail was published in the January, 1898, *Ohio Dental Journal.*

In brief, the six bands are soldered together and to a narrow plate that is swaged to fit their lingual surfaces, then the labial portions of the incisor bands are cut away so as to leave only small anterior extensions between the teeth which when properly reinforced with solder and finished, answer every requirement and look much like approximal gold fillings.

While this appliance—with variations that can be easily made to it—will perfectly retain the teeth after correcting all ordinary cases of irregularity, it is not sufficient, on account of the short grasp which it has, to retain teeth that have been moved bodily with the contouring apparatus.

I am now pleased to say that this demand is adequately supplied by a new retaining appliance that is giving me the greatest satisfaction in these cases. In fact, while it is a perfect retaining appliance for the purposes for which it is intended, it also can be made to exert a considerable contouring force in moving the roots of the incisor teeth forward. And I have no doubt it would be sufficient for this purpose in many cases of early youth when the required movement is not very great.

The incisor teeth are banded with rolled platinum and gold plate, .004 inch in thickness, cut straight and sufficiently wide to extend from the incisal to the gingival borders, with the joints of the bands on the lingual sides. When these are soldered and excess cut away the joints are flattened with smooth pliers and then the bands are perfectly fitted to the respective teeth. In this process a considerable portion is cut away, so as to leave a narrow band encircling the teeth on the labial and approximal sides at the extreme incisal portions—the entire lingual surfaces of the teeth being covered. See Fig 19. While the bands are in position, having been perfectly contoured and fitted to the teeth, a plaster impression is taken that imbeds the bands only and includes the bicuspids. The bands are then removed, carefully fitted in their respective places in the impression, which is filled with Teague's or any investing material.

With the bands now in position on the model take a Teague's compound impression with which make die and swage a 28 g. reinforcing plate to cover the entire lingual surfaces to which it

is soldered, carrying the solder through between the approximal surfaces and filling the V shaped spaces on the front.

The next step is: Solder tubes to the linguo-distal borders that shall take a direction and extend to the linguo-occlusal borders of the second bicuspids. The size of the tubes, which may be of German silver, or preferably, of platinum, should be drawn to exactly fit a No. 10 M. wire.

It will be seen by the illustration that when the apparatus is in place the distal ends of the wires are even with the occlusal surfaces of the molars. The molars are banded and carry an open tube soldered to the linguo-occlusal borders.

When the apparatus is cemented and sufficient time is given for the cement to perfectly harden, the wires—which are threaded and carry nuts to exert force at the mesial ends of the molar tubes—are slipped into the tubes, and then forced down into the open molar tubes which are closed over them. See Fig. 20.

DISCUSSION.

Dr. H. J. Goslee, of Chicago: While not at all unmindful of the honor and pleasure of opening the discussion upon the subject so ably presented by the essayist last evening, I do so, at the same time, with more or less hesitancy; because, I fancy that but few of us are capable of appreciating to the fullest extent the grand work that is being done by the essayist in the line of orthodontia. We are enabled in a minute way to glean from the presentation of his charts and diagrams an idea of the work that he is doing. Everything he does is done in the most artistic manner, and yet I fear that I might even be skeptical as to the possibility of the marvelous results that he obtains, but for the fact that I have often seen their practical application. The work that he gave you last night is but a brief outline of the work that he gives the students of our college during his course every winter. I know that all of you will agree with me in saying that but few of the ordinary practitioners of dentistry are capable of appreciating the great amount of labor that he has put in this line of study. Were I to presume to criticise the various acknowledged authorities on this subject, I think that my criticism would be that most of them give entirely too much space to the details of application and not enough to the discussion of principles. Principles are never changing, always the same; but detail is always chang-

ing, changing with every individual case that we have, and it has remained for Dr. Case, of our society and of our State, to present to the profession the truths in orthodontia in a scientific way by a study of the application of force and of principles. I feel, gentlemen, that I cannot do this subject any more justice than to simply say that we owe him a very deep debt of gratitude for the grand work that he has done in this line.

Dr. Case: In answer to Dr. Ottofy's question relative to the cause of the opening of the bite in the case mentioned, I would say that I do not know. The possibility of the eruption of the third molar teeth may have produced that condition. I advised the removal of these molars and the grinding of the occlusal surfaces of the teeth sufficient to permit him to masticate his food more perfectly than at present; and then to take accurate measurements of the distance between the upper and lower incisors with some instrument that he might make, and watch for any change in the opening. At any time the teeth could be extruded and a more perfect articulation brought about.

I am very much obliged to you, gentlemen, for the manner in which you received my paper last evening and the attention which you gave to it.

THE PREPARATION OF CAVITIES.

By M. L. Hanaford, D. D. S., Rockford, Ill.

No house was ever built but it might have been a little better. No watch ever made by the hand of man so perfect but it might be a more accurate timer or more beautiful in finish. No cavity in a tooth was ever so well prepared and filled but a master might criticise it adversely, and a more skillful mechanic might have performed the work better.

Hence, "line upon line" from various individuals and different standpoints; of discussion and demonstration, which will literally never end, until the last caries inducing microbe shall have been killed or perpetually enjoined.

Permit me then to ask your attention for a little while to the preparation of cavities in teeth from a mechanical standpoint.

I have on former occasions in dental societies raised a doubt as to the mechanical ability of the average dentist, and the dental mechanic has in each instance been valiently defended by his brethren, as was to be expected. Nevertheless I have no hesitation in expressing my conviction before this body, that not only is the *average* dentist a poor mechanic, but that the expert is a *rara avis* in the dental profession.

Humiliating it is, indeed, to see evidences of inadequate skill or to find in our own case, as I often do, that we are not equal to the mechanical requirements of a case. Let us learn to do the work before us at least as well as other mechanics do their work in their specialties. I know workmen in other lines who might well laugh to scorn the bungling efforts of the average maker of artificial dentures; jewelers who put us to shame in handling and working the precious metals.

I know the custom of lauding the fine finger craft (?) of dentists; but I prefer to take the unpopular side, and direct your attention to the filling which might have been beautiful and substantial, but was a miserable failure from the lack of knowing what to do and how to do it.

The preparation of a cavity has been likened to the foundation for a house; but the analogy is wanting for the reason that a good house (superstructure) may be built on a poor foundation, while it is mechanically impossible to build a good filling into an incorrectly prepared cavity. Indeed, after an experience of twenty years, I am strongly of the opinion that the preparation of the cavity is, mechanically and scientifically, very nearly seven-eighths of the entire filling operation.

The formation of cavities has been taught in various ways—by drawings, diagrams, models and by actual cases in the clinic.

Drawings are almost never true—they need to be "allowed for," as the ladies say, which is almost equivalent to using one's own judgment; models may be said to represent ideal rather than actual cases; the clinic at the chair is of course the best of all, giving all the circumstances and difficulties as they would be met in one's own practice.

While we cannot use the clinic in this discussion I propose by utilizing the science of photography to approach nearer to it than would be possible to me in any other way.

Before coming to the illustrations, may we briefly consider some of the requirements of the different classes of cavities?

First, there is the filling which is designed merely to stop a hole, called by our professional forefathers "plugs." These include cavities in occlusal surfaces, buccal cavities not involving the occlusal surface, labial cavities and a few approximal cavities.

The requisites are, carious dentine removed with the possible exception of a small portion nearest the pulp, fissures followed to their termination, strong walls very slightly divergent from without inward, and smoothly beveled margins.

Second, approximal cavities in incisors. Here we need beauty and grace of outline, conservation of the labial wall when possible; plenty of room in which to operate, obtained by wedging and free sacrifice of the lingual wall; ample retention against force of the opposing jaw which is directed both outwardly and laterally, to be obtained by general shape, and broad, shallow opposing grooves, together with retaining pits or corners only sufficient to fix the first pieces of gold.

Third, approximal cavities in bicuspids and molars.

Here in addition to the requirements of class two, we must have a formation of cavity calculated to sustain sufficient bulk of

filling material to withstand the enormous stress of the forces of mastication, restore contour and preserve the interproximate space.

These latter qualifications have been especially emphasized during the last few years, but that has only been necessary because the profession failed twenty years ago to recognize the genius and heed the teaching of the immortal Webb, a man whose words and work were well nigh a generation in advance of his time. It was my fortune to enter the dental profession during the period when the Arthur theory of treatment and prevention of decay was exerting its greatest influence. "Contact is dangerous" was the doctrine, and the dental profession bowed down before it. So-called permanent separations were the accepted practice and forthwith disks, chisels and files of various diabolical shapes were devised and used with zeal, for the dental mechanic is nothing if not enthusiastic.

During the ascendency of this theory, namely in the year 1873, I well remember hearing, in the city of Philadelphia, a paper by a pale young man from the country town of Lancaster, describing several extensive contour operations, in which he said, "The teeth operated upon, when completed, touched each other as in nature." And the most of the wise men there present shook their heads deprecatingly, but one said, "Gentlemen, we must look to our laurels, the young men are coming to the front." Prophetic words, as we now know.

Gradually the essential truth of the new theory made its way and now behold—after twenty-five years, the opposite end of the seesaw is up and your enthusiastic operator, who has been told that teeth should be restored to full contour with all that it implies, is diligently at work cutting away the approximal surfaces of all teeth operated upon—in other words, "extending for prevention," and using as it seems to me as little discrimination as did the permanent separationist of twenty-five years ago.

What conclusion are we to draw from the foregoing facts? Surely none other than that the dental profession as a class is a great company of hobby riders. Dr. Robert Arthur was not a fool. Although an extremist, he was a great teacher. All great teachers of the world have been extremists. There was good in the Arthur theory, and is to-day, if rightly put in practice; likewise there is good in the teaching of the present, respecting con-

tour and "extension for prevention," but if carried to the extreme often advocated, it becomes reckless audacity. For myself, I would rather, in many cases, take the chance of a second or third operation which may never be necessary, than to practice universally the extensive cutting one hears so much about nowadays.

Let us not blindly follow a dogma for the same reason that we change the cut of our trousers, namely, because it is the fashion.

I recognize here the danger of being misunderstood, but shall hope to make my meaning unmistakable by means of the illustrations to follow.

In undertaking to illustrate by photographic lantern slides the preparation of cavities for filling, I am perfectly aware that I am accepting a large contract. It is said that "fools rush in where angels fear to tread." The "angels" have, so far as I know, feared to enter this particular field, leaving it to me, the other fellow, to rush in.

However, as I wish to show you actual teeth and not models or drawings, I choose this as the most feasible way to show and talk about the same thing to all at the same time. If I pass around the specimens for your inspection, you may be looking at a molar while I am talking about an incisor, or vice versa. I therefore invite your attention, first, to cavities in incisors and show you four typical forms. First, a cavity in an incisor as shown here on the screen, where decay has been of slight extent. Access is gained by cutting away the lingual plate of enamel, enlarging sufficiently to render manipulation direct and positive, but no more. With margins clear and strong and the cavity only a little larger inside than at the orifice, I would proceed to fill. He who would cut away the entire approximate surface in such a case to restore with gold, is, in my judgment, a meddler—a dental jeweler—nothing more. If the patient is less than twenty-five years of age, this cavity will probably need refilling in five or ten years, but it will be just as likely to need refilling if a more radical operation is made at this time.

As the second type of cavity in incisors, I show you this one in which caries has been more extensive. The object here is to conceal the gold and leave a filling when completed, that will be largely self-cleansing. To this end the labial plate of enamel, or dentine and enamel, is retained in all but a very small minority of cases. As in the first type, the lingual wall is freely sacrificed

and the work performed entirely from the inner (palatal) aspect. The cervical margin is carried far enough rootwise to be clear of contact with the adjoining tooth, and made reasonably straight and slightly countersunk. The labial margin will usually come somewhat further toward the labial face of the tooth than in this instance. It is to be made true and smoothly beveled with chisels and just perceptibly grooved, if thick enough to admit of it. The point of the cavity toward the incisive edge is deepened to form a retaining corner.

The lingual wall is brought well into the body of the tooth, which facilitates access and gives a broad overlap of gold to receive the stress of occlusion. Many fillings of this type, if not planned and constructed with great care, are driven out laterally by the force of the opposing tooth.

The third type of cases includes those cavities in which caries has progressed so far toward the incisive edge, as to render unsafe any undercutting for retention at this point but where, for æsthetic reasons, it is desirable to retain the labial plate of enamel. In such a case the lingual plate is removed for a sufficient distance from the incisive edge rootwise, and extending into the body of the tooth far enough to make possible a step. This is to be deepened at its extremity, squared and made retentive. The remaining labial wall is beveled and so protected by the gold as to present the smallest area to forces tending to break it down. I believe Dr. C. N. Johnson, of Chicago, was the first to publicly describe this form of cavity, although it has been practiced by myself and perhaps others for a dozen years or more.

In the fourth type we simply go a little further—cut away the weakened labial wall and incisive edge, make our step longer and broader and proceed with our wholesale restoration. I show you this tooth before and after the preparation.

Cavities in cuspids have ever been regarded as among the most difficult to properly prepare and fill, especially upon the distal surface. The bicuspid adjoining is always in the way. It has been my custom for many years to prepare those cavities in such a way that the introduction of the filling may be done mostly in line with the long axis of the tooth, very little lateral work being necessary. The lingual wall is freely removed and a dovetailed step cut into the body of the tooth, of sufficient depth and breadth to give ample retention, and bear the stress of the opposing tooth (an

exceedingly difficult case to photograph and I fear but indifferently shown).

Owing to the difficulty in securing bicuspid teeth suitable for illustration, my remaining slides are all made from molars, but for the most part the principles are the same in both classes. The first case is that of an upper molar in which is seen an amalgam filling, a rough, illy condensed mass, placed in a badly planned, poorly prepared cavity. The margins, as you see, are irregular in the extreme, and in two places badly chipped, and yet, although this filling has been in use many years, and the tooth was finally lost from other reasons, there is not a particle of decay anywhere about it.

I show you another similar case in which caries has extended slightly at one of the cervical angles. The point I raise is this: Did not the dentist who made these fillings do his patient a good service and, given better mechanical execution, would it not have been a better and altogether a more acceptable service than a more heroic operation would have given?

Before answering this query, we will assume that this cavity is to be refilled, and proceed to prepare the cavity scientifically as nearly as we are able.

Here we have a direct lateral view. The cervical margin is carried almost to the cementum and the lateral walls widely extended and beveled. This one shows the occlusal surface and the extent to which the coronal fissures have been cut. We have now consumed approximately an hour of valuable time, besides inflicting a good deal of pain, and to what end? Renewing the question of a moment ago, "Which of the two operations is the better for the case?" I mean as to the extent of cutting presuming the first operation to have been well done. I would answer for myself, "that depends." If the patient is past middle life and the destructive agencies which produce caries are losing, or have evidently lost, their activity, I should say by all means the more conservative operation is indicated; because, even though a lapse of years may show some slight extension of caries, the chances are altogether that it will progress so slowly that the patient will have good use of the tooth as long as needed. Then in the small number of cases where it may prove necessary, a second operation or a slight repair is entirely practicable. On the other hand, if the patient be between twenty and thirty-five years of age and caries still

active, no radical *extender for prevention* would be more insistent than I upon the importance of heroic measures.

I have here another molar which I present for your consideration. Two methods of preparation suggest themselves again—the conservative and the heroic. I show you the former as my answer to the question "Which?" Strong walls remain after thorough excavation, which in the *absence of special reasons*, it would be in my judgment, a sin to cut away. Here we have a direct view of the occlusal surfaces. In most cases of this kind the two cavities here shown would better be joined together, not because there is any particular danger of failure at that point, but the finished filling will present a more acceptable appearance if so joined.

Lastly, I show you this extensive approximal cavity, and ask you what we shall do with it. Here the enamel is undermined in every direction and hangs over, thin and jagged. Evidently none but the most heroic measures will avail.

This is a lateral view giving the general outline. The articulating face of the buccal cusp is removed and the remaining pillar beveled to an obtuse angle—the cervical wall is carried to the cementum through its entire length—the extreme edge beveled and the floor slightly countersunk. The lateral walls are grooved at a little distance from the edge, and a second floor or step cut into the body of the tooth, obliterating the anterior sulcus and grooves; more clearly shown in the next slide, as is also the beveling of the buccal cusp.

I have thus endeavored to indicate to you some of my ideas on the preparation of cavities. They are based upon a somewhat varied experience covering a period of twenty-five years, and I give them in no spirit of dogmatism, but for just what they are worth. My plea is, first, for better mechanical work in our great calling; second, for a reasonable conservatism in the planning of operations, together with sufficient knowledge and so-called "nerve," not to hesitate at the most heroic measures when clearly demanded of us.

NOTE.—The illustrations used by Dr. Hanaford showed very nicely on the screen. It is to be regretted they could not be used to good advantage for printed cuts.—[ED.]

DISCUSSION.

Dr. W. E. Harper, of Chicago: I wish to express my thanks and appreciation for the effort, labor and expense that the essayist has so kindly made in the interest of our State society and the profession. I am aware of some of the great difficulties that he has had to contend with, having tried to illustrate the subject by means of photography myself. But I feel that I cannot permit the occasion to pass without making my humble protest against the methods of preparing cavities as advocated by the essayist. In this work I consider the two essentials to be—extension for prevention, and flat seats at right angles to the direction of the stress, as described by Dr. G. V. Black. These two principles I look upon as forming the basis of scientific cavity preparation. They have not been disproved, and have been confirmed by experience and observation in my modest practice, and for a great many more years Dr. Black's own practice, where he has had the opportunity to observe the results through two to four generations, often in the same families. I feel the essayist is mistaken in thinking that any operator carries out these rules for extension in all cavities, as conditions and circumstances must be and are considered, such as age, physical condition, disposition to decay, and where proximating teeth are lost. If I have any reason to believe that there is further disposition to decay, I should in all cases include in my cavity the parts of the surface so disposed, and carry my margins to a location of immunity, which in all proximal surfaces would exceed that advocated in this paper. If we were to find a cavity involving the middle third of a tooth in a patient of fifty or more, and in which there was practically no disposition to decay, it would be unwise to make the ordinary extension that would be called for earlier in life. Again, we may have in the mouth of an adult a great disposition to decay, and I would in that case make radical extension. Again, where the proximating tooth has been lost there is no necessity for a radical extension, as we already have a self-cleansing surface. There may be other conditions that would make it inadvisable to carry out this extension for prevention, and I do not think that any operator has advised this radical extension in all cases.

I recognize the ability of some few operators to fill cavities in proximate surfaces in incisors from the lingual, but I do not think it is wise to risk the durability of a filling simply to avoid exposing

a little gold. Under the most favorable circumstances it requires much skill to insert a filling in the proximal surfaces, and I would protest against adding to the difficulty, as I would consider a bright gold filling looks better than a black labial margin or wall, which will very generally result. If this method of procedure is carried out, I judge that the difficulty of access, particularly in the incisal angle, or at the junction of the incisal with the labial wall, would render it very difficult to adapt gold perfectly. This question of extension for prevention is too large to be considered from all standpoints at this time. I am free to confess that the cavities that have gone back on me in my practice have been the small cavities. The large cavities in which I have made great extension, even before I had any knowledge of the advisability of extension for prevention, are the ones that are to-day the best of those that I inserted in my early practice.

I have had the opportunity of examining the cavities from which these illustrations were made. I noticed that, in a general way, they were prepared with the gingival walls rounded, the retention depending upon grooves made in the walls. Lacking the flat seat, there would be a disposition to move under heavy stress, as it is known the most effectual method of resisting stress is to place the resistance at right angles to that stress, which is not the case if the seat of the cavity is made rounded, so that I would again take this occasion to emphasize the necessity of flat seats, which means flat in all directions, mesio-distally and bucco-lingually. I again am opposed to the grooving. If these buccal and lingual walls are extended even to meet the requirements of prevention in a modest way, they are too weak to locate grooves in them for resistance to the tipping strain, so that you must of necessity depend upon an extension into the occlusal surface of that tooth for resistance to that tipping strain. Again, the advisability of flat seats is emphasized in the condensation of your gold. If you try to condense gold against an inclined plane or if your seat is rounded it will slide or roll. The location in which you place your first gold we will call the linguo-gingival angle of the cavity (referring to blackboard). You may have a little pit, which is what I observed in the cavities prepared, and that little pit is depended upon as a convenient form in starting the first portion of gold. My judgment is that in placing that pit there, there is a very minute surface for the cohesion of the mass within that pit to the mass within the

cavity. There is a great disposition for the gold to roll in this direction (indicating), to slide, which is such a common complaint with operators. In my judgment, if that cavity was made sharp and angular and your force is directed in this way (indicating), there is no disposition for your gold to slide in any direction. That gold can be absolutely locked and condensed, either in this or in that direction (indicating), with very little disposition to move, so little that a slight pressure with some instrument will retain it until you have gradually built the mass of gold over to a point located on the buccal wall, and then continue your building. I am very free to confess that I cannot, in proximate cavities in bicuspids and molars, fix my mass of gold where I have made my seat as shown here, concave (indicating). I can do it with very little difficulty in this class of cavities with a seat so prepared, flat (indicating). In the preparation of that seat we not only facilitate the filling of the cavity, but we extend this angle linguo-gingival and bucco-gingival, which is so necessary for prevention of recurrence of decay. In the occlusal half of the buccal and lingual walls there is not the same disposition to decay that there is at these linguo-gingival and bucco-gingival angles. I would ask your consideration of the cavities, or fillings, that were shown in the teeth last night. I noticed that the greatest caries were found at this bucco-gingival angle; in the center of the gingival margin there was not so much; in the occlusal half of the buccal and lingual walls there was not so much because the excursions of food had protected them. Again, if anything is wedged and retained at that point it is more liable to be removed than if it were located down there. So in squaring out you increase the seat of your cavity and you carry this angle to a portion of the buccal and lingual surfaces of the tooth which is practically immune from decay if sufficiently extended. I would not depend upon a rounded groove alone extending from the gingival to the occlusal to resist the tipping strain, because if you have made even a modest extension your buccal and lingual walls are too weak to stand it, because that filling is disposed to tip to the mesial and the resistance offered by this groove is practically parallel to the direction of the force instead of being at right angles to it. We will let that represent the proximate surface of a bicuspid (indicating). Now supposing we have made even this modest extension of the cavity, I would not consider that extension for prevention, it would not meet the

requirements as I interpret them. This margin is too near the point of proximate contact and must be carried to at least about that point (indicating). Allowing that it was not carried to that point, decay would occur about here (indicating). Suppose it was located at that point (indicating), and I would groove it to resist that tipping strain there (indicating). If a tipping strain of fifty or one hundred pounds is exerted on the filling that wall is too weak to stand it. Again, in making the resistance here, instead of being at right angles, it is practically parallel with that wall there. The stress would be brought against that inclined plane and the stress on that wall would be increased by virtue of the law of the wedge; it would simply wedge that wall and failure would result. A step on the occlusal surface would much more effectually resist it. In no case would I depend upon a rounded groove; in fact, I cannot, in my work at least, make a cavity too angular. When I say angular I mean no less, practically, than a right angle. It is common to think or believe that you cannot fill these angles. You cannot fill an angle with a round plugger point, but if you take a plugger point that will fit an angle you can better fill it than you can fill a rounded groove.

The essayist made the statement that the average life of a filling that is confined to so small an area on the proximal surfaces of the teeth is five or ten years. I am quite agreed on that, but I am not agreed on his statement that in radical extension it would also be apt to fail in five to ten years. I do not believe that is borne out by clinical experience. I believe if such failures result in a general way it is due to faulty manipulation of the gold after preparing the cavity correctly. If you extend correctly and adapt the gold perfectly, unless there is a very great disposition to decay, I do not see that you should have any failure in five or ten years, and I have seen charts that have been made from Dr. Black's own record which will illustrate that conclusively, and I should be very happy to have him refer to those charts that he has made from his records, as I think it will help to clear up this question.

Looking upon those two features, flat seats and extension for prevention as forming the basis for cavity preparation, I do not know that there is much more to be talked about.

Dr. G. V. Black, of Chicago: I do not know what the disposition of this society will be as to the discussion of this paper or as to the extent of the discussion. Probably it will not be the dis-

position to discuss it at considerable length. There is perhaps no more important question just now to be discussed than the preparation of cavities. I am under the impression that there is more advance being made at the present time, or within the past few years, in the preparation of cavities than in any other one thing in operative dentistry. And so it is the most important thing that we can discuss at this time, and yet, we are behind in our program and we must hasten through our work, because there are other important papers to come up.

I was exceedingly interested in the presentation last night, and was especially interested in the photographic feature of this presentation. It is the first serious endeavor to present this subject by means of photography. I have been thinking along that line considerably myself. How can we present this best to our classes and to the dental profession? I have thought considerably of photography in this connection, and this being true I was especially interested to see how these pictures would work upon the screen, and I wish to compliment the gentleman upon his effort. It being a pioneer effort, he is especially to be complimented on the work he has done, even though we have the feeling that it was not everything that could be desired. It shows a very great promise for this means of presenting this subject. On the other hand, it seems to me we failed to appreciate the principles involved in extension for prevention, and the principles involved in the relation of the form of cavities to the stress that comes upon fillings as has been intimated already by Dr. Harper. There seems to be some who jump to the conclusion that the idea of extension for prevention is to cut big cavities. Now that is not correct. We extend to prevent only where there is something to prevent, a liability to caries that is to be prevented. Instead of reckless cutting, what is involved in extension for prevention is a careful study of the surfaces of the teeth as to the immunity of certain surfaces and certain portions of surfaces, as to the liability to decay of certain surfaces and certain portions of surfaces, and of having come to a reasonable, and what seems to me a just conclusion as to the portions of surfaces that are liable to decay and the portions of surfaces that are immune from decay, then cutting so as to arrange your cavity lines, the lines of your margins, within the limit of the immunity from decay. This is what it means, and it does not mean extension of pit cavities where all the region

around the cavity is immune already. For instance, take a cavity upon the buccal surface of a molar in a person twenty years of age. Almost universally that pit is sufficiently removed from the unclean portion of that surface for all its margins to be immune, when it is on account of the pit that decay has occurred there. Now, it would be simply nonsense to talk about extending such a cavity for prevention. Take again the cavities occurring upon occlusal surfaces that occur on account of faults in those surfaces. All around that fault the surface is immune from decay. We would not extend that for prevention; we would only extend along grooves for the purpose of obtaining a good finish. There would be no reason for extension for prevention because the surface around the decay is already immune from decay. Hence, we confine extension for prevention to proximal surfaces, to surfaces habitually unclean, to surfaces, indeed, that are especially liable to be attacked by decay; and when we find such surfaces about our carious cavity we study them closely and extend in order that the lines of our cavity may be laid just within the region of immunity from decay. Dr. Harper has spoken something of my experience along this line. It would take me too long to run over this whole field, as it is much too large. I remember one case that comes now prominently to my mind. A little girl was brought in to me. I had attended to her grandfather's teeth, to her father's teeth, and the mother's and grandmother's on both sides, from time to time, and knew the family to be prone to terrific decay of the teeth. This little girl, eight years old, came in with an incisor already badly decayed upon its distal surface. At one sitting I took out the entire proximate surface well below the gingivus; at another sitting I put a gold filling in that cavity, and at still another sitting I finished it. She is now a grown woman and every proximate surface in her mouth has been filled since, except those of the lower incisors. They have all been treated in that way, and that woman is proud to say that she has never lost a filling. She takes a pride in saying it. Nor has she lost a tooth. That is worth something; it is worth something for patients to have confidence that fillings will do that which they are intended to do. It is a great deal better, even though you succeed in saving the teeth, than to make half a dozen fillings to do it.

Now, gentlemen, I ask you to study this carefully and con-

scientiously; study this question of immunity of certain portions of the teeth, of the liability to decay of certain portions of the teeth under the conditions present, because these are varying continually with each individual patient that comes to us. The liability will be different, more or less, yet, there are certain lines of liability that we all know and understand, or we should. It is study of this character that should guide us in laying the lines of our cavities in order that we may prevent future decay. Then we will study also the changing disposition due to age. We know well that the liability to decay is greatest in youth, and as a person arrives at maturity it diminishes; that is the general rule. In some families we will find that this rule does not hold, and we must study these families carefully and critically as to the liability to decay. Then again, as persons become old there is a certain return of the liability in a proportion of cases, against which we will have to guard and guard very carefully. We need to study the habits of caries along these lines, for there are certain underlying causes of caries that we do not know yet, and we can only at present study it as to its habits. I hope that some day we may be able to know more about these changing conditions, know more of the whys and wherefores. We certainly know more to-day than we did some few years ago. The work of Dr. Williams along this line has thrown much light upon this subject; the finding of microbic plaques upon the surfaces of teeth, and the illustrations of the effects of the acid occurring under these plaques, by Dr. Williams, has done a whole lot to throw light upon this subject; and I venture now to say that we will find no caries beginning in any mouth except under these microbic plaques, and the reason for decay occurring in one and the immunity of the other is the fact that the conditions are such in the one that the microbic plaques are formed, and in the other the conditions are such that the microbic plaques are not formed. I am now enabled to cultivate microörganisms in broth in such a way that they will form these microbic plaques upon the walls of the tube, and in such a way that they will not form them. And recently Dr. F. B. Noyes has cut for me sections of the gelatinous product formed by microörganisms in my tubes artificially; the same microörganisms in other tubes, with the broth treated a little bit differently, have formed no gelatinous masses whatever. Now, it is along these lines that we will study, in future, the underlying causes of caries

of the teeth, and until we know more about it we will study the habits of caries, and we will so lay our cavity lines as to prevent decay, laying them upon surfaces immune from caries, and thus preventing the recurrence of caries; and at the same time generally flattening our seats, arranging to support the stress that comes upon our fillings so they shall not be moved by the stress. This means careful, close, manipulative work; and as I have talked so much about amalgam in recent years, let me say here, if any one supposes that in doing this I am recommending amalgam as in any way taking the place of gold, where we can properly manipulate and handle gold, he is mistaken. Gold is the king of filling materials. What I have done has been mostly to show the unutility of amalgam fillings, and to show how we can improve this very poor material.

Dr. C. N. Johnson, of Chicago: I feel some hesitancy in consuming any time in discussing this subject, because, I believe the members of this society know very well my position already on this question of cavity preparation. However, I will refer to one or two points brought out by the essayist. Some members of the profession seem to have the idea that the advocates of extension for prevention advocate it in all cases. I want to endorse what has already been said, that it would be utter folly to carry out the extensive cutting in all cases; and we are sometimes justified in putting in fillings, even in proximate surfaces, that are narrow. But what I do want to emphasize is this, that every time we put in a narrow filling on a proximate surface, we must have in our minds the possibility that we will have a failure there sooner or later. It may be advisable in many instances to do this temporary work; in fact, we are all called upon to do it at times, because of the conditions that may be present. A patient may be in a nervous condition that will not permit us to extend these cavities to the full extent that we believe to be necessary for the most permanent work. But we must also bear in mind, as I said before, whenever we are compelled to put in a narrow filling without extension, that we are doing work that in the ordinary course of events will be more or less temporary; and such work must be watched subsequently. And I will say, as Dr. Black has said, that wherever we can do so, if the conditions are at all favorable, we should extend these cavities to the lines indicated, so that we do the most permanent work in the first operation. In ordinary

cases it is better to make a permanent operation the first time than it is to be compelled to repeat that operation. By making our work permanent we increase the confidence of the public in the utility of dental service.

Now in regard to just one other point, the distinction between the concave seat and the flat seat. An illustration of that came to my notice very prominently last week at a meeting of a dental society where I was giving a clinic. The tooth was a bicuspid, and I had made the flat seat and started the filling with gold. A gentleman came along and said, "What do you do now if that begins to rock?" My answer to him was that "It will not begin to rock." I want to say that the time of rocking fillings has passed in my practice. Having the seat flat, you start the filling in one angle and carry it across to the other, and lock it between the buccal and lingual walls. It may require slight retention with an instrument in the left hand for the first pellet or two, but when you get it locked you can mallet on it as hard as you wish and that filling will not rock. But it seems to be a difficult thing for some men to realize that. This same gentleman stood beside me later in the operation, as the filling was being built up, and he turned around and said to a friend, "I will be blessed if I see what holds it there yet." And so it is; the average dentist does not seem to have a mechanical perception on this question of anchoring fillings. It is simply a question of mechanics.

Dr. M. L. Hanaford: By the courtesy of our secretary, I am handed a stenographic report of the remarks of the preceding speakers, with the privilege of saying a few words in closing my paper, although not personally present to hear the discussion.

I wish to thank the gentlemen who have spoken, and others from whom I have heard privately, for their kind words in regard to the photographic work done in connection with the paper. Of course, no one without experience in a like undertaking can form any idea of the difficulties involved. While, as Dr. Black says, the results are not all that we could desire, perhaps enough has been accomplished to show that photography may be used successfully in illustrating subjects of this kind.

Possibly at another time, and under more favorable circumstances, better results may be reached.

As for the special points in the paper, as commented upon by

Dr. Harper and others, especially "extension for prevention," I may say that the conservative ground was there advocated strongly because it seemed to me that the other, or more radical practice, was being overemphasized in these days, that the tendency, especially with the younger men, might be not to discriminate closely between conditions calling for extensive cutting and those where operations of less extent would avail. Dr. Harper implies that I am mistaken in supposing that any teacher has advocated extensive cutting in all cases of proximal decay. I reply that the only means we—the common people—have of knowing what a man thinks and teaches is by noting carefully what he says. We have listened from time to time to hours of learned disquisition, and read long articles in support of the theory of "extension," but never to my knowledge, until this discussion, has the other side been presented, and assented to by as many as three eminent teachers.

True, this assent has been rather parenthetical, as who should say, "We knew it all the time," but each speaker has stated, and the statement is timely and valuable, that *some* teeth having decay on their proximal surfaces may be preserved by fillings of moderate extent.

My main contention, therefore, is that it is our business to find out which ones are amenable to such treatment, and act accordingly.

But while emphasizing for a special purpose the idea of a reasonable conservatism, I endeavored in my paper not to lose sight of the opposite great fact that where indicated, the most radical measures are justifiable and necessary, and upon this basis my daily operations at the chair are planned.

I spoke of the average durability of fillings, and have been taken to task for speaking of the second or third operation, which I was careful to say might never be necessary. In this connection I may say that I do a great deal of admittedly temporary work for young people—in fact, I rarely make a gold filling for a patient of less than twenty years of age. I do not thereby lose his confidence, as has been predicted; on the contrary, by treating thus tentatively I gain and strengthen a confidence which is likely to become a lifelong friendship.

The case related by Dr. Black, of the patient of eight years only goes to show what may be done by rare skill and tact. Not many dentists could succeed thus, and Dr. Black is too wise to recommend that you or I attempt it.

Two points more—the first is the flat seat—a mechanical detail which I use often. One of the cavities illustrated showed substantially that construction. Dr. Harper forgot to mention it.

The last point—the filling of the cavities in incisors from the lingual aspect.

Dr. Harper's criticism shows plainly that he has not studied this detail with his usual thoroughness, else he could not speak of thus "adding to the difficulty of access," but would know that in no other way is access to every part of the cavity so readily gained, and that, too, by the sacrifice of the wall of least importance.

Incidentally less gold will be shown than by any other method —in some cases none at all—thus conforming to the rule of art, which should prompt us to seek to conceal our art. I thank you.

THE CERAMIC ART IN DENTISTRY.

By John Egbert Nyman, D. D. S., Chicago, Ill.

Modern as is the application of this art in our profession, in itself it is one of the most ancient of arts, a mute witness testifying to the existence of man upon this earth in that dim, mysterious age known as the prehistoric.

The vast number of specimens that have been found in the barrows, as these ancient burying places are called, of England, Scotland, France and Scandinavia, have led scientific men to believe that it was practiced by the prehistoric races from the Neolithic age down; the specimens are vessels, most of them formed of coarse clay, the color varying from brown to gray and red, some of them of fine texture and with glazed surface, varying in size from those eighteen inches in height and twelve inches in diameter, to those of a four inch height and proportionate diameter. On some occasions prehistoric man cremated his dead and these larger vessels are usually found filled with burned bones, consequently they have been designated cinerary urns, while the smaller vessels are supposed to have been used in the religious rites, and then buried with the ashes of the dead, although some have been found which it is thought were used for domestic purposes.

And no mean artisan was this ancient inhabitant of the earth; these urns and cups are quite graceful in shape, ingeniously and sometimes lavishly decorated with carvings, all the work of his hands alone, for this was before the time of the potters' wheel. He baked them with fire, as the experts who have examined the numerous specimens in the British Museum have agreed; and, taking them all in all, surprising, indeed, was his skill, considering the age in which he lived and the circumstances amid which he worked.

Verily! Verily! Some things are not as new as we thought they were.

The art was practiced by the ancient Egyptians, who are also supposed to have invented glass, and about 4,000 years B. C., one

of them invented the potters' wheel. The Assyrians practiced it, utilizing it in making imperishable literary and historic records; also the Phœnicians, Greeks and Romans and Chinese, each country giving some distinguishing characteristic to the porcelain of its manufacture.

The last of these, the Chinese, were probably the first to make porcelain which resembles the porcelain of to-day.

It may interest you to know that the name given to finest potters' clay, kaolin, was derived from the name of a mountain in China, called Kao Ling, which contained large deposits of clay of a very fine quality, by the use of which they were able to manufacture such beautiful porcelain. Other deposits of clay of equal excellence have been found in various parts of the world, but the Chinese name remains to-day the accepted one. All the modern peoples, the Italians, Persians, French, German, English and Americans are engaged in the art; their productions are something marvelous from a mechanical point of view; and from an artistic, beautiful beyond description.

HISTORY OF THE CERAMIC ART IN DENTISTRY.

Porcelain was introduced into our profession by the French about the year 1815, being utilized in the manufacture of artificial teeth. The result of their labors, however, was most unsatisfactory, the teeth having such low structural strength that they could not stand the force of mastication, almost invariably cracked upon being submitted to the high temperature necessary for soldering them to the metal plates, the coloring on them was crude, was solvent in the fluids of the mouth, and they were imperfect in size and shape.

For about twenty years little or no progress was made in the matter until Dr. Elias Wildman, of Philadelphia, made such improvements in the art that he was able to eliminate the hitherto objectionable features and produce teeth of the most natural appearance and shape, which are said to compare favorably with those of to-day. According to Dr. Essig, Dr. Wildman should be given the honor of having first placed the manufacture of teeth upon a scientific basis.

Various methods were tried to obtain a porcelain compound which would fuse at a lower point than that of the teeth, so that gum restoration could be obtained, but little or no success attended

the efforts until in 1846, Dr. John Allen, of New York, succeeded in compounding the long desired article, which, slightly modified, is even to-day probably the best porcelain compound that we have.

He demonstrated the possibility of gum contour and revived and firmly established the continuous gum denture.

THE COMPOSITION OF PORCELAINS.

The basic element of all porcelains is silicon; all the essential ingredients are chemical compositions of it.

Silica is a binoxide of silicon.

Feldspar is a double silicate of potassium and aluminium.

Kaolin, or potters' clay, is a hydrated silicate of alumina.

Silica is about the most infusible substance known, especially in the form of agate or flint. It is incorporated in porcelain body to maintain the molded or carved shape of the mass during the fusion, at the high temperature necessary, and to give structural strength to the porcelain mass after it has been fused.

Kaolin, or clay, is a necessary ingredient, because, by means of it, compounds containing it may be molded and carved in any desired shape; by itself it is quite infusible, but when mixed with feldspar it fuses with it at a high temperature; it is also an element of strength in the porcelain, but not to the extent that silica is.

Feldspar is necessary to give translucency, an enameled surface, and a uniform heat-conducting property to the mass so that the fused porcelain will not crack when subjected to the heat required for soldering metals.

The compounds when mixed together in certain proportions, which vary according to the opinions of the different manufacturers, is technically known as "body."

The colors used in tinting porcelain, technically known as "frits," are metals or metallic oxides as follows:

Gold for reddish browns.

Platinum for blue grays.

Titanium oxide for yellows.

Iron in combination with gold and oxide of titanium for neutral gray.

Silver and tin in combination with gold to form what is known as "purple of Cassius," giving the pink tint seen in gum enamel.

The process of preparing these "frits" is both chemical and mechanical, too elaborate to be given here and varying according to different manufacturers.

To insure a uniform tinting of the porcelain mass by the frits, and a perfectly glazed surface of the porcelain when fused, it is necessary to have what is known as "flux," which is a glass usually composed of silica, borax and oxide or carb. of potassium.

The various ingredients of the "body" are each finely ground, with the exception of the feldspar (which it is said loses some of its translucency if too finely ground at first), in a wedgwood or porcelain mortar. They are then mixed together in certain proportions, fused, and then reground, labeled "body," and placed aside for further use.

The coloring compounds are likewise ground, mixed together, fused, reground, and labeled "frits," yellow, gray, pink, etc., as the case may be.

The ingredients of the flux undergo a similar treatment.

Then body, frits and flux are mixed together according to the tint desired and in the proportions the manufacturer thinks best, and the porcelain compound is ready for use.

EXAMPLE.

Feldspar	8 oz.	Body, 16 ozs.
Silica	6 oz.	
Kaolin	2 oz.	
Silica	8 ozs.	Flux, 14 ozs.
Borax	4 ozs.	
Carb. pot	1 oz.	

Oxide titanium....40 grs. Frit.....40 grs.

The quantity of starch, about ten grains to the oz., is added to most of the compounds to increase the cohesion, so that when the molded mass is dry it may be handled and carved without danger of crumbling.

The fusing point of a porcelain compound may be lowered by: First, decreasing the amount of silica and increasing the amount of borax and carb. of potassium in the "flux."

And second, by decreasing the amount of "body" and increasing the amount of "flux" in the compound; but this lowers the structural strength and the mass is apt to lose its molded, carved shape, and assume a spheroidal form in fusion. This will be demonstrated when we come to review certain experiments.

As has been said before, the various processes, chemical and

mechanical; the proportions, primary and secondary, vary according to the different manufacturers, each jealously guarding his secret, accounting for the variations, slight though they may be, of color and general appearance among teeth and porcelain compounds from different manufactories.

EXPERIMENTS.

In view of the absence of accurate data in regard to the fusing points, crushing points and shrinkage of the different porcelains, and of the widely varying opinions of different members of our profession, based upon their clinical observations, I undertook some experiments to settle, if possible, these much mooted points. At present I will but give you the results of the experiments, wishing for the time being to keep the methods by which I obtained them to myself, assuring you that later on they will be made public and submitted to whatever criticism you may see fit to make.

Here I beg to digress a moment to express my gratitude to the following gentlemen, without whose aid I should not have been able to have successfully concluded my experiments. To Drs. F. B. Noyes and G. A. Thomas; and in an especial manner to Drs. G. V. Black, W. V-B. Ames, G. W. Schwartz, L. K. Stewart and Mr. C. F. Bryant; Dr. Black having, upon hearing of my work, placed his magnificient scientific apparatus at my disposal, and Dr. Ames having thrown open to me his splendidly appointed laboratory.

The following porcelain compounds were tested: Ash's, Brewster's, Closes', Downies', Consolidated, Johnson & Lund's, Moffat's, Rose's and Wyatt's, with these results:

	FUSING POINT.	SHRINKAGE.	CRUSHING POINT.
Downies'.....	Same as 18 k. solder	15 per cent.	290 lbs.
Wyatt's.....	" "	15 "	290 "
Ash's.....	" 20 k. "	15 "	325 "
Brewster's.....	2045 F.	17 "	325 "
Rose's.....	2090 F.	15 "	380 "
*Consolidated.....	2090 F.	15 "	255 "
Close's.....	2120 F.	14 "	380 "
Johnson & Lund's.....	2335 F.	14 "	385 "
Moffat's.....	2150 F.	14 "	405 "

*The piece of Consolidated porcelain body upon examination was found to be a very faulty one, full of air bubbles, and the result noted should not be taken as the true crushing point of the body. It is without doubt much higher than the figure given.

After completion of the experiments the writer concluded that the above results were not a true indication of the relative structural strength of the different compounds from the fact that the cubes tested were so small (3x3x2.5 mm., this size being the largest that would fit into the points of the crushing machine used) although he believes it to demonstrate that the high fusing compounds are of greater structural strength than the low fusing.

In order to ascertain about what strain the average bicuspid and molar porcelain crown would withstand, the writer constructed what he thought was an average size crown of each of these, identical in every way with a crown that would be constructed for practical purposes. They were ground off flat on both top and bottom; the dimensions were as follows:

	BICUSPID.	MOLAR.
Top to bottom	7 mm.	7 mm.
Mesio-distally	4 mm.	8 mm.
Bucco-lingually	6 mm.	6 mm.

Justi teeth and Close's porcelain body were used. These were then tested at the Armour Institute of Technology in a standard testing machine (made by Riehle Bros., of Philadelphia) by Mr. E. C. Kerr, the professor of mechanical engineering, with the following results:

	BICUSPID.	MOLAR.
Cracked	1,740 lbs.	2,230 lbs.
Crushed	2,240 "	4,020 "

These results seemed astonishing, and as the average crushing force of the human jaw is about 175 lbs., the writer believes that this demonstrates beyond doubt that the average porcelain crowns have strength sufficient to withstand any pressure that may be brought to bear upon them in mastication.

I might also say in passing, that, from clinical experience I prefer Close's body, although I find it necessary to grind it finer than it is as prepared for the market.

It is very strong, carves nicely, adheres firmly to the metal structures, and cracks so little when properly manipulated that I am frequently able to complete a crown with but one fusing.

METAL STRUCTURES FOR PORCELAIN WORK.

Pure platinum for bands and caps.

Iridio-platinum for posts, beams, and braces. These are the only metals, suitable for use in the mouth, whose melting point is

higher than that necessary for the fusing of the porcelain compound. The statement that pure platinum is as soft as pure gold is incorrect.

Platinum is harder than gold, unannealed eight to five; annealed six and one-half to five. Judging from a clinical standpoint it seems to be about as pliable as twenty-two k. gold.

SOLDERS.

Pure gold may be used if the different parts of the metal structure are in actual contact. The gold then seems to act as a flux, welding the parts together, so that they will not separate even when exposed to a temperature higher than the fusing point of gold. No attempt, however, must be made to jump joints or fill in crevices with gold in soldering; if this is done the parts of the metal structure will separate, when the fusing point of gold is passed, in the fusing of the porcelain compound, and the shrinkage of the porcelain in fusing is extremely likely (especially if it is a bridge) to pull the parts of the metal structure out of their relative positions to one another, ruining the work beyond repair, just as it was about to be completed.

And even if, by some inexplicable good fortune, this warping does not occur, there will be an unsoldered joint, held only by the porcelain compound; a weak point which will almost certainly give way when the bridge is subjected to the force of mastication.

The writer feels positive that this is the cause of failure in a large percentage of the failures met with in porcelain bridge work.

Open joints must be filled in by packing in platinum foil, or more preferably, forcing in slightly wedge shaped pieces of iridio-platinum plate, if gold is to be used in soldering the structure.

PLATINUM SOLDERS.

During the past year we have had brought to our notice the best one thing that has been given to porcelain workers in a number of years, viz., a solder by means of which joints can be jumped when necessary, and the use of which dissipates all danger of unsoldering the parts of the metal structure in the fusing of the porcelain compound. It has been designated platinum solder by the man who invented it, Dr. W. V-B. Ames, of Chicago, to whom, by the way, our profession is indebted for many things it has never given him credit for.

It is an alloy of gold and platinum in certain percentages, ten, twenty, thirty, forty and fifty per cent.

If thirty per cent platinum solder is used, there need be no fear of open or unsoldered joints after the case has been completed, that is if any of the porcelain compounds, except Johnson & Lund's have been used; if joints are to be jumped and that body be used afterward, you must jump them with fifty per cent platinum solder.

METHOD OF MAKING PLATINUM SOLDER.

The proper proportion by weight of platinum or gold is obtained, for example, if twenty per cent solder is desired it will be, platinum six grs., gold twenty-four grs.; thirty per cent, platinum nine grs., gold twenty-one grs., etc. The platinum should be rolled out in a thin ribbon, as thin as possible, and about one-eighth inch in width. The pure gold is melted in a globule and the platinum ribbon fed into it; after that has been done the mass resulting should be rolled out as thin as possible, cut into ribbons, and remelted as before; this repetition of the first melting process insures an even distribution of the platinum through the mass; it is then rolled down to about ga. thirty-four, properly marked and it is ready for use.

A Knapp blowpipe will be necessary for the manufacture and use of the platinum solders, the gas blowpipe being insufficient for anything above ten per cent.

INVESTMENTS.

Investments may be of the following materials:

Plaster, silex, asbestos (fine), equal parts.

Plaster and asbestos (fine), equal parts.

Fine asbestos and water.

Plaster investments, with potassium sulphate added, stand high temperature with less cracking than investments without it.

Investments should never come in contact with water after they have hardened. Do not boil out the wax. Soften with dry heat, pick out with instruments, and dissolve out the residue with chloroform. There will be less shrinkage and cracking under high heat when treated in this manner.

Teeth should be coated with shellac, which, under high temperature, forms a protecting film of carbon upon the facings, pre-

venting etching by the silex in the investment, and lessening the danger of cracking.

It is not my intention to rehearse and reiterate that which is common knowledge with most of us, so I shall omit the usual description of the continuous gum set and its method of manufacture, considering only the elimination of that universal objection to it, its weight; this may be reduced by using very thin platinum (thirty-two ga.) for a base, reinforced by iridio-platinum wire across the heel and a double thickness of plate in the anterior portion.

Dr. Thomas has tested plates constructed after this method by putting one upon the floor and allowing Dr. York to walk upon it; he broke the cusps off several teeth but failed to crack the plate.

These plates have no greater weight than the average gold plate, and have sufficient strength to stand the masticatory force of the jaws; unfortunately, however, this method is not applicable in partial sets.

A framework of iridio-platinum wire should be made to support continuous gum sets while fusing them.

CROWNS.

Close, short bites should be avoided; cases should be selected with rare judgment as to articulation and probable stress.

Bands should be of twenty-eight or twenty-nine ga. pure platinum; caps of thirty ga.; posts of iridio-platinum, sixteen ga. for molars, centrals, and cuspids; eighteen ga. for laterals and bicuspids.

Roots should be cut off at gum margin, so as to allow of as large a mass of porcelain in the crown as possible.

Roots canals should be enlarged and posts fitted, however, before root is completely cut down; a crooked or thin root may prevent your enlarging the canal to sufficient depth to admit of a post long and strong enough to support the crown, in which case a portion of the root should be left above the gum margin to assist in the retention of it.

Countersunk holes may be drilled in caps from the lower side with a cone bur to assist in the adhesion of porcelain compound to cap.

All sharp edges and angles in the metal structure should be rounded off, the porcelain body fusing on it with less cracking if this is done; the facing should be so ground as to allow it to come down on the band as indicated in Fig. 1; this will give a more artistic effect than can be secured if the facing is ground even with the band, allowed to project a little and then body fused in between it and the band (see Fig. 2 point A).

The difficulty of securing artistic results in crowns will depend largely on the contour of the gum margin. If the margin is as indicated by the solid line in Fig. 3 then it is comparatively easy, but if it is as indicated by the dotted lines in this figure you have a difficult case to deal with.

To start with, the buccal side of that root cannot be beveled

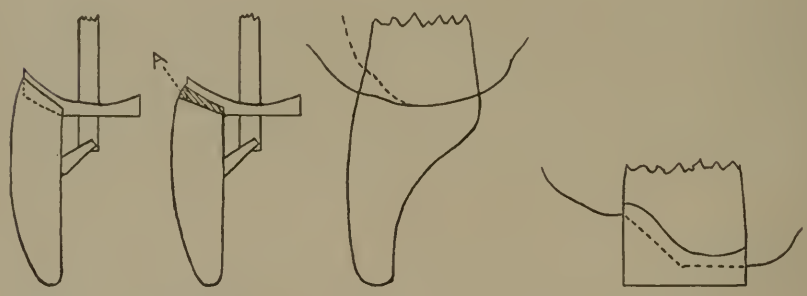


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

with a wheel without mutilating the gum margin at that point beyond repair; it should be beveled with a flat faced chisel.

After trimming and beveling the root proceed as follows: Fit the band as indicated in Fig. 4, then mark the gum margin carefully and mark out a V shaped section on the buccal side (see Fig. 5); cut this out with a pair of fine scissors, being careful not to cut clear through the band, replace it on the root and burnish this part from which the section has been cut back against the beveled surface as indicated in Figs. 6 and 7.

The top is now ground even with the flat surface of the root, the cap soldered on, and the worst is over.

There will be no harm done if the edges of the band at point A Fig. 7 are not in actual contact and soldered, as the joint will be covered by the porcelain body afterward.

NECESSITY FOR PROXIMAL AND GINGIVAL CONTOUR.

The necessity for proximal contour in crown bridge work is just as great as it is in compound fillings. The interproximate spaces adjacent to a crown must be protected or soon the gum tissue there will show signs of irritation and inflammation, the first stages of a pathological condition which will mean a short period of usefulness of the crown, with continued discomfort for the individual wearing it.

The writer also wishes to call attention to a new point, viz., the necessity for gingival contour.

He believes that the many instances of inflammatory and congested conditions of the gum margin around the crown, particularly on the buccal side, are due to the fact that the crown has not been contoured so as to resemble the natural tooth crown at that point.

A cross section of a tooth cut off at the gum margin will be

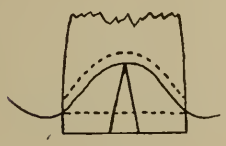


FIG. 5.

FIG. 6.

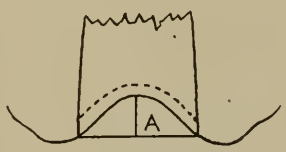


FIG. 7.

represented by Fig. 8, the shaded sections representing the enamel; as a rule, after the crown has been constructed and attached to the root, a cross section at the gum margin will appear as in Fig. 9. It will be readily seen that at the gum margin a space has been left, represented by the dotted lines, that was formerly filled by the enamel; as a result the gum does not hug the crown as closely as it did the natural tooth, and débris of food will gradually work in under and cause trouble.

The crown should be contoured by fusing body over the band so that a cross section at the gum margin would appear as in Fig. 10 There is no danger of the porcelain flaking off of the band if the gauges of band, cap and post are of the size advised in the first part of the paper.

As to whether this is a matter important enough to be made a principle of practice, I need only say that my views in the matter are fully endorsed by no less authority than Dr. C. N. Johnson, of

Chicago, who, after listening to what I had to say about it and examining some practical cases in the mouth, fully appreciates the necessity for gingival contour.

LENGTH OF POSTS.

If the length of the post from the cap to the end of the post is equal to the distance between the cap and the tip of the highest cusp of the crown, the post is of sufficient length to withstand any strain, as there will be no chance for a leverage to be exerted in stress upon it. (See Fig. 11.)

A post of the length from B to D will be of sufficient length to securely maintain the crown, the length from B to D being equal

Fig. 8.

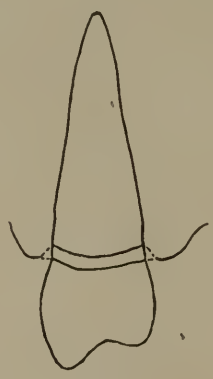


Fig. 9.

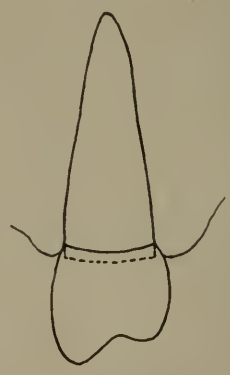


Fig. 10.

to that from A to B; a post extending only from B to C would be too short for security and one from B to E longer than is necessary.

ORIGINAL METHOD FOR CLOSE BITE ON ANTERIOR TEETH.

It so happens that often in the very place where we most desire to make use of porcelain crowns, viz., in the region of the anterior teeth, the articulation is such that the edge of the lower incisors strikes just about at the point where the pins in the porcelain facing would be; and if the crown were made in the usual manner there would be but a thin veneering of porcelain over those pins, which would give way as surely as twice two are four. After considering many methods to avoid this danger the writer finally hit upon the following :

In the construction of the crown as large a post as is possible is used. This is adjusted so that the lower incisor almost touches it in occlusion; it is then ground down on a bevel, as indicated in Fig. 12; the facing is ground in place, waxed up, and invested; the pins are bent down as far as possible and ground flat; then a piece of fourteen ga. square iridio-platinum wire is rolled down to sixteen ga. and adjusted and soldered on top of the post and pins and the incisor is allowed to strike on that; the porcelain is afterward baked on about the crown as usual, leaving this piece of iridio-platinum exposed; this takes the entire brunt of the bite and removes the danger of fracture of the crown at its weakest point. The appearance of the finished crown from the lingual surface is shown in Fig. 13.

BRIDGE WORK.

If rare judgment is to be used in selecting cases for porcelain crown work, still rarer judgment must be used in the selection of

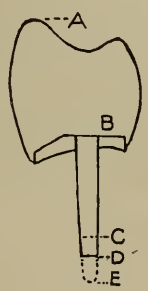


FIG. 11.

FIG. 12.

FIG. 13.

cases for porcelain bridge work. The bite should be long enough to admit, on an average, a minimum thickness of porcelain of at least four mm.; *there should be at least half as many abutments (favorably placed in regard to stress) as the total number of teeth in the bridge*, and there should be a normal articulation.

Avoid arranging the metal structure so that any one point exposed to the force of mastication will be covered with only a veneer of porcelain.

The different parts of the metal structure of the bridge, bands, caps, posts, beams, cross-beams and saddle, should be assembled, soldered together, and then tried in the mouth; for if there is any

little alteration to be made, such as burnishing the saddle a little tighter to the gum at any one point or bending the structure at any place to secure a perfect fit, it can be done then much better than after the facings have been soldered on.

ADVISABILITY OF USING SADDLES.

This is quite a mooted point in porcelain bridge work, but the fact that porcelain facings on the ordinary gold bridges are frequently imbedded in the gum in a haphazard manner, without any pathological condition arising therefrom, has led the writer to believe that the proper kind of saddle, accurately fitted, is no more apt to cause such a condition; but, on the other hand, will strengthen the bridge (by making it a two beam bridge, which any civil engineer or bridge builder will tell you is stronger than a single beam one), and is a much more comfortable denture for a patient

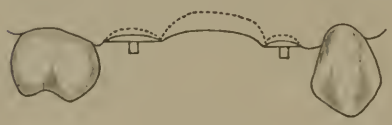


Fig. 14.

Fig. 15.

Fig. 16.

than an open bridge, under which food is constantly crowding, seldom to be completely removed and frequently imparting a very unpleasant odor to the breath.

A saddle should never be used if the missing teeth have been but recently removed and complete absorption has not taken place.

But there are saddles and saddles, and one as indicated in Figs. 14 and 15 will almost always give trouble and should never be used; and from conversations with men for whose opinion I have great respect and whose condemnation of saddles was pronounced, I found that they based their opinions on the observations of just such saddles as Figs. 14 and 15 illustrate.

There is so much motion in the tissues around the edge of

such a saddle in mastication and swallowing that a tight joint cannot be secured without imbedding the saddle so deeply in the tissue as to cause either hypertrophy of gum, or atrophy, which will leave a crevice that will be a perfect catch-all for débris of food.

But a saddle as indicated by Fig. 16, if carefully adjusted, as it may be by a method I will refer to later on, and the edges carefully rounded and polished, when completed is perfectly advisable and may be used without danger of unpleasant results.

METHOD OF OBTAINING ACCURATE FITTING SADDLE.

Upon obtaining the impression, with the abutments, caps and posts in position, before pouring the model trace the outlines of the saddle, as you wish it to be when completed, with a fine pointed instrument; take a piece of sheet lead, rolled to thirty-two gauge, and burnish it down on the impression, trimming it to the outline traced; then pour the model, and upon removing it from the impression the sheet lead is removed and the model will be found more accurately deepened than could have been done by scraping by hand; and a saddle fitted to that model will, when finished and placed in the mouth, imbed itself in the gum just the thickness of thirty-two gauge plate and no more. It may occasionally be necessary to do a little burnishing when it is tried in, but in the majority of cases a saddle fitted according to this method will not require any alteration whatever.

BRIDGE WORK WITHOUT SADDLE.

Still, if you cannot be induced to believe in saddles, you can obtain the strength, but not the opportunity for restoration of lost parts, by adopting the method devised by Dr. G. W. Schwartz, of Chicago, of, in addition to the horizontal cross beam, inserting a second beam bent so as just to clear the gum. When the bridge is completed the lower edge of this second beam is exposed its entire length, although it does not come in contact with the tissues at any point. This method, however, requires a comparatively long bite to obtain satisfactory results.

METHOD OF ATTACHING BAR TO SHELL PLATINUM CROWN.

It may be that owing to the peculiarity of the articulation at the posterior abutment of a porcelain bridge it is deemed necessary to construct a shell platinum crown. If the bar used as a cross

beam is soldered to the shell crown with thirty per cent platinum solder, it will be securely attached beyond all possible danger.

Numerous failures, however, have been experienced by a number of very skillful men when the soldering was done with gold, although the contact was as perfect as they could make it. The weight of the bridge causing a tendency to sag in the middle when under high heat and either draw the bar away from the shell crown entirely, or enough so as to weaken the joint, with the result that sooner or later, under the force of mastication, the bridge breaks at that point.

The writer has devised the following method of attaching that bar so that there is no danger of its giving way, either during fusion of the porcelain or when in use in the mouth, even if it has been soldered with gold:

The band having been adjusted, a flat cap is soldered to it; a square bar is selected for a cross beam; place it upon the cap and mark its outlines; ascertain its thickness, add to this the thickness of the plate in the cap and mark it upon the mesial side of the band. (See Figs. 17 and 18.)

The cap is ground through at point A, then with a Gordon-White separating saw, saw into the cap along the two dotted lines to point B and at the same time into the band along the two dotted lines to point C. Then turn up the flap A B and turn out the flap A C.

Slip the bar into the opening letting it extend under the cap past the point B, then clamp both flaps upon it tightly, there will then be an attachment that when soldered with pure gold will never give away under any circumstances, the following figure will illustrate a cross section of the completed joint.

METHOD OF MAKING SOLID PLATINUM CUSPS.

Even the best of us are forced at times to do a little grinding of the cusps to relieve some little peculiarity of articulation which could not be foreseen.

For a number of years the writer has used solid cusps, so that this might be done without danger of cutting through the metal cusps and exposing the cement, as would be the case if a shell cusp were used.

There is the same good reason for using solid platinum cusps, if platinum shell crowns are made use of.

They may be constructed by first swaging a platinum shell cusp, and then swaging platinum sponge or foil into it until it is filled, then soldering it together with gold or platinum solder, ten per cent, carrying it to a high heat.

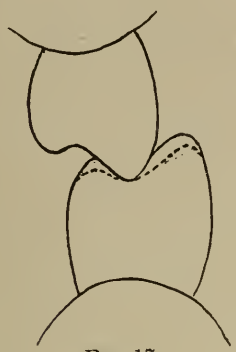


Fig. 17.

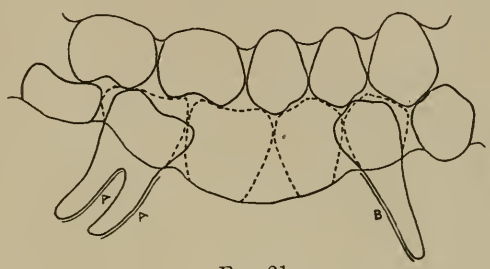


Fig. 21.

CAUTIONS IN REGARD TO ARTICULATIONS.

The usefulness of a bridge is frequently impaired and cusps are broken off of them because the articulation has not been properly devised.

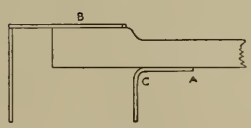


Fig. 18.

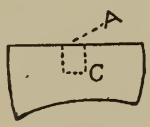


Fig. 19.

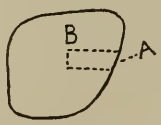


Fig. 20.

The jaws have a lateral motion in articulation, and if the cusps are closely dovetailed, as in Fig. 20, that motion is prevented; the articulating surface should be formed as indicated by the dotted lines.

REGULATION PRIOR TO INSERTING BRIDGE WORK.

Sometimes regulation is necessary before the construction of a bridge should be attempted.

Suppose, for instance, that the inferior first molar and second bicuspid have been lost, the chances are that the second molar has tilted forward and the first bicuspid tilted backward, as indicated in Fig. 21; it will be readily seen that the roots are at such an angle one to the other that when the bridge is completed it

will be almost impossible to get it on, especially if the posts are of the length they should be; and many a bridge is constantly loosening and being reset simply because the posts had to be cut off so short to get the bridge on, that they are of no use for retention.

But there is another feature to be considered: Suppose a bridge is constructed according to the dotted lines in Fig. 21. The pressure upon the roots is doubled, and, because of the tilting, it is concentrated upon the mesial half of the molar roots, at points A A, and the distal half of the bicuspid root, at point B, consequently the pressure will be four times greater than normal upon these surfaces, and an attempt at mastication will probably result in such pain that it will be abandoned, and the bridge will be of no service to speak of; even if pain, by some miracle, should not result, the concentrated pressure will induce a pathological condition resulting in the loosening and the eventual loss of the roots, bridge and all. I trust that this feature will be so manifest to you that you will always bear it in mind. I recall two cases now of beautifully constructed bridges that were of no use whatever owing to just this condition of affairs.

Correction of these irregularities will render the construction and insertion of the bridge an easier matter and will insure a longer period of usefulness of it to the patient.

METHOD OF ATTACHING CROWN AND BRIDGE WORK WITH CEMENT WITH THE POSSIBILITY OF REMOVAL WITHOUT MUTILATION.

Many the time have many of us wished that we could remove a crown and bridge without mutilating it, and welcome, indeed, will be an ideal method of attachment which will permit of it.

Attachment with gutta-percha does, it is true; but it is so difficult of manipulation I have never been able to operate it to my own satisfaction, and it is too yielding to be a secure means of attachment when subject to more than the average strain in mastication.

Attachment with cement is the most secure from all points of view; the cement in itself is firm and unyielding, and it is adhesive to a remarkable degree.

The writer of late has been using the following method to set crowns and bridges with cement, and yet enabling him to remove them without mutilation. It is very simple:

The post (which should be unnotched and tapered) and the underside of the cap is coated with a film of thin sandarac varnish; this is allowed to thoroughly harden and the crown is then set with cement as usual.

This thin film of varnish while in no wise lessening the security of attachment, upon heating, softens and breaks the adhesion of the post and cap with the cement, allowing the crown or bridge to be readily removed.

PORCELAIN INLAYS.

Porcelain inlays, when made and used in the usual manner, are so seldom a success that I do not believe in them at all, except when used to fill buccal cavities in the incisors and bicuspids, and even then when made by burnishing thin platinum into the cavity as a matrix and fusing the porcelain compound into it, afterward stripping off the platinum, the result is usually an artistic failure, as the porcelain compound when fused in such small quantities seldom comes out exactly the same color twice.

My method is to select a tooth facing the proper color, grind a section of it to fit the margins of the cavity as closely as possible, then burnish in the thin platinum matrix, place this section in the matrix, fill in the crevices between the matrix and the section with Downie body of the nearest color, and fuse; stripping off the platinum afterward, then setting with cement.

The fusing of the Downie body in no wise affects the color of the section and the result is the most artistic that may be obtained.

It has been my experience and my observation that porcelain inlays in compound or grinding surface cavities last but a very short time, and the percentage of failure is so high that the use of them in such places should be abandoned.

The only opportunity for permanency that I can imagine would be in large cavities, which would permit of a large mass of porcelain in the inlay, but this would mean such an immense loss of tooth structure that the frail walls would probably fail at some point, so that is would be better to cut off what was left of the tooth at the gum margin and crown the root.

CAUTIONS IN REGARD TO DISCOLORATIONS.

A discolored portion of porcelain will spoil the appearance of what might otherwise be a most artistic piece of work, and the

causes are likely to be so unsuspected that one may be at loss what to ascribe it to.

If there is a dust of gold or platinum filings on the table at which you work while putting on and carving the porcelain, there is mixed with them probably some particles of iron from the file, and if the compound comes in contact with this dust there will be a discolored portion at that point when the porcelain has been fused.

If there are metals in solution in the water that you use there will be discoloration.

If you grind the porcelain after the first baking with a carborundum wheel or point, there will be a discoloration at that point after a second fusing. So, to avoid these, dust off your table carefully before commencing your work; if you must lay it down and leave it a while, cover it with a glass cover. That known among jewelers as a "movement cover" is the best for the purpose.

Use distilled water in mixing and applying the compound. If any grinding is done with carborundum, dress down the surface left with sandpaper disks.

Observance of these precautions will avoid the danger of discolorations.

METHODS OF HIDING SLIGHT CRACKS IN PORCELAIN FACINGS.

By some misfortune a slight crack may occur in a porcelain facing, and, while causing no weakness in the case, may be extremely unsightly; this can be perfectly and permanently hidden by simply immersing the case for fifteen minutes in liquid albolene. Upon taking it out, washing and drying it, the crack cannot be detected, and, under the moist condition of the mouth, it will never make its reappearance.

RESTORING ENAMEL SURFACE TO PORCELAIN FACINGS AFTER GRINDING.

It is sometimes necessary, to obtain artistic effects, to grind the buccal surface of a porcelain facing. The enamel surface may be restored to a facing so ground by painting the surface with a thick solution of borax and water, and then heating the facing to the melting point of gold, or by painting the surface with liquid silex letting it dry and then heating it to a point half way between the fusing point of gold and that of Close's body.

CARVING OF PORCELAIN.

An idea of what can be done in the carving of porcelain can be readily formed by those who have seen the beautiful work exhibited by Dr. Schwartz here at this clinic. There is no easy method by which it may be accomplished.

Close steady of natural teeth, with practice in carving modeling compound, continued with perseverance, will finally enable one to obtain the most artistic results.

Further, artistic results may be obtained by tinting surfaces and staining sulci with the Dresden porcelain paints.

Gold fillings may be imitated by grinding a slight concavity in the facing and fusing into it Marsching's Roman gold for china decorating, afterward burnishing it with a glass burnisher.

Your success in this work will depend entirely upon your skill, together with the patient, persevering endeavor with which you attempt to carry it out.

METHODS OF FUSING PORCELAIN.

Most of the methods of fusing porcelain are familiar to you. The coke, oil and gasoline furnaces are quite out of date; the gas furnace almost so since the advent of the electric furnace.

The old time methods were so laborious and the furnaces so cumbersome that many shunned the work. The results were uncertain; scarcely two pieces ever fused to the same degree of nicety; more cases overfused or underbaked than were fused just right.

Of the gas furnaces the only effective one I know of is the one invented by Dr. G. W. Schwartz. With it Close's body can be fused in three to four minutes. Unfortunately he has, up to the present, applied his principle only to smaller furnaces for crown and short bridges, not having as yet constructed any large enough for continuous sets.

The most ideal method of fusing porcelain is by electricity. The heat can be increased so gradually, can be so perfectly controlled, and the results are so uniform that this method excels all others.

Still the ideal furnace remains to be devised. They are most capricious things at present. Without any warning there may be at any time a splutter and a flash and the furnace is "burned out."

The electric furnaces of the muffle type are the simplest and

the most easily repaired. They are very good for fusing crowns and short bridges, but the center of the muffle attains a higher degree of heat than either end, so that a case which fills the entire muffle will be overfused in the middle by the time the ends are fused.

The Custer furnace, owing to its shape and construction, attains a uniform degree of heat in all portions of it, consequently from a crown to a full upper set can be perfectly fused in it.

The intricacy of the wiring, however, makes it very difficult of repair, and the imbedding of the wires in the fire clay increases the liability of its "burning out." Dr. Custer, however, has improved his furnace greatly, by bringing his wiring to the surface of fire-clay instead of completely imbedding, thereby doing away with disagreeable flaking of the clay, and lessening, to some extent, the danger of burning out; and by so shaping the two halves of the furnace that when open a case may be put in or taken out much more easily than formerly.

POSSIBILITIES AND PROBABILITIES OF PORCELAIN WORK.

Porcelain prosthesis offers the highest possibilities to be found in prosthetic dentistry.

It is strong, clean and accurate.

There is difficult detail about it, to be sure; but, on the other hand, there is no "backing" of facings, and better still, no tedious polishing to be done as in gold work; it comes from the furnace finished, with every surface most beautifully enameled.

There is no harrowing fear that facings will chip off.

Cusps may be built up and depressions formed to perfectly accommodate the most unique articulation.

It permits of the most beautiful carving and tinting and of such perfect restoration of lost parts that the expert is really able to "hold a mirror up to nature."

Is it to become a permanent method of practice, or is it to suffer the fate of fads? If the steady increase in the practice of the work that has been seen in the last few years is any criterion, and if the results of experimental investigations and practical tests of time count for anything with the profession, then surely its future is fair and certain. But, alas! alas! in the very places where it should be encouraged and taught, it is being neglected and ignored.

In all the world there are at present but two dental colleges

that give scientific, systematic instruction in this work. There is surely enough merit in it that the student should go forth fully instructed and competent to practice it.

Still, he who undertakes the work must be prepared to calmly face a few failures until he has become an expert.

In the past years when the work was in an experimental state, the writer had enough of them to sicken one's soul. They staggered, but did not stop him; and looking back now he feels that each taught him some needed lesson. He is now firmly convinced of its mechanical and artistic merits, and urges its adoption and practice by the whole profession, for it is the very acme of prosthetic art.

DISCUSSION.

Dr. C. B. Rohland, of Alton: I shall only take a minute of your time. When Dr. Allen asked me to allow him to put me down to open a discussion on some paper I told him to go ahead. I did not suppose for a moment that he could select anything that I did not know something about; but I underestimated his capacity, for he very promptly did that very thing. Fortunately for you, I happen to know when I do not know anything about a subject, so I shall not trouble you very long, and as your time is limited will save you an infliction. However, if I am not competent to pass judgment on all of the details which the doctor has given us, owing to my comparatively limited experience in the manipulation of porcelain, I do know a good thing when I hear it, and I appreciate to the full the practicability of his paper and the immense amount of information and labor that its preparation involved. I was particularly pleased with some of the practical points that he has given us here, because I have been troubled myself with the discoloration, for instance, of porcelain when it is ground with carborundum. That has troubled me a good deal in what little work I have done, and I never knew just what occasioned it. Also the hint given us as to the use of borax was a new thing to me, and I am very much obliged to the doctor for that one point alone. The paper with its mass of information, so ably presented by Dr. Nyman, cannot fail to stimulate closer attention to this kind of work—a consummation devoutly to be wished—for the objectionable, not to say at times offensive, conspicuousness of much of our work leaves it a matter of doubt sometimes in my mind whether the patient has not been more injured than benefited.

Dr. G. W. Schwartz, of Chicago: I wish to personally thank Dr. Nyman for this very excellent paper, from the fact that it is along the line of work I am mostly interested in; and I fully appreciate the amount of labor it has taken to compile this paper. The history has required a great deal of time, as well as the working out of the practical experiments.

The first article I will take up in the paper is the test for the crushing of porcelain. He has given us the direct pressure only, and the criticism I would make is the experiments were not made with a lateral strain; but he hopes later to bring that out, and I am sure he will give us to a certain extent the accurate strain laterally. I intended to make these experiments myself, but he has gotten ahead of me.

The next article is the relation to the gauge of the metal. I forget what he quoted, but I know it is not quite as thick as I use for caps and bands. As a rule, I use twenty-eight and twenty-nine gauge platinum for bicuspids and molars, the very softest piece of platinum I can get, from the fact that it takes the shape of the root so kindly, making it easy to fit the root accurately; and for the laterals and centrals I usually use twenty-nine or thirty; for laterals I use thirty or thirty-one; and for the caps for the bands I use platinum iridium. I believe in seating a bridge on the same principles that Dr. Black seats his fillings, and I believe that the seat of a bridge should be extra strong when making the metal frame. I agree in regard to the size of the post and bars. I use the stiffest platinum iridium I can possibly get.

And here I wish to speak about the size of the band. In nearly all cases dentists doing porcelain work make the mistake of making the bands too wide. I use the very narrowest possible band I can make. Now, in proportion to that crown I would consider the band wide enough for all ordinary uses (referring to blackboard).

I wish to next thank Dr. Ames very kindly for what he has done for us in the way of solder. He has made practical to porcelain workers one of the best things that has been given to them in the last two years, that is, the manufacture of platinum solder; and in giving us this solder he has made it possible for us to thoroughly strengthen joints; for instance, we will suppose this is a platinum cap (referring to blackboard) as is often used in the back part of the mouth, where the bite is close and porcelain is

not desirable. Now, the main trouble I have always had was at this joint of the platinum cap and cross bar. We used to run a bar after this manner (indicating) and solder with pure gold; that is when we first began to do this saddle work and solder stays in like that. In order to get any stability to this piece of work through here (indicating) this ought to be grouud very accurately and fitted so that the parts would be in exact position, and then soldered. Dr. Ames has given us a solder that we can flow into that joint and it will not fuse out when it is baked. A fifty per cent solder is practicable and can be used with the oxyhydrogen blowpipe, and Dr. Ames has also perfected an oxyhydrogen blowpipe with which we can do this. Now, with the fifty per cent or forty per cent platinum solder this joint would remain intact. It has always been my custom, since I found that was the place where my bridge was most liable to give way, to split this bar and bring it around labially and lingually, and by soldering it to the crown I would have the bar in position so that it could not get away. Sometimes I have gone clear around the cap in order to grasp it and hold it firm.

I also wish to say something about the strength of porcelain. The greatest mistake has been made in not equally dividing the strength between the roots of the teeth, the metal and the porcelain. Dentists as a rule are afraid to cut down far enough in a great many cases. Suppose this was the occluding edge of the tooth here (indicating), they would be afraid to cut down to the gum further than that (indicating); they want that for the band. I think this is unnecessary, because a great deal of the work should rest on the post and frame, and the cap should be merely to keep the bridge in position and prevent splitting of the roots; and a band that is just under the free margin of the gum is sufficient. In all my cases I find this is extremely practical, and it is not necessary to go down and cut away some of the process; I certainly would not go further than the free margin of the gum. There is a great deal of metal to go in this bridge and it is necessary to divide the strength equally between the metal and porcelain. Now I do not use my bar too large. When we first began this work we found that there were two others who disagreed with us in regard to the size of the metal bars to be used; one dentist in particular contended that he used the metal bar just as large as he possibly could, and he used the square bar. I told him that after a while

he would come back to the smaller bar and that he would round the corners in the bargain, and he finally did. Porcelain in baking does not like very sharp angles. You can carve your work ever so sharp and when it is baked it has assumed the rounded shape that you generally want it. For that reason I would suggest that your metal work have some of the sharp corners rounded and no sharp angles be left to subject the case to fracture from heavy occlusion after it is set.

Another point I wish to call attention to is the method of constructing this platinum cap. I consider it one of the most difficult things to do. I first fit my platinum band as I require it—we will suppose this is the occlusal part of the tooth (indicating). I fit my platinum band first and contour it to about that proportion (indicating). After I have properly fitted my band I lay it down on a hone and I hone it flat. Then I get the proper occlusion in either modeling compound or plaster and carve my cusps as near as possible to the form of the tooth to be reproduced. Then I make my die and counterdie and swage a piece of platinum iridium; then I swage another and I nest these two and swage them together; then I solder them together, and I hone this cap down until it is just right to articulate and until the cap and the band come square together; then I solder them together accurately. They must fit accurately because it is folly to try to fill up any chinks or crevices. I solder this cope together in that way and I keep the blowpipe flame on it for at least two minutes after it is soldered in order to alloy the two pieces so they will not come apart. Now, since Dr. Ames has given us this solder, the cusps can be filled with fifty per cent solder, if necessary, and you can grind on that all you choose; and in that way you have a very good cap; then you can put your bar in or out just as you choose. In making a cap in that way we will have a platinum cap that we can rely on as being just as safe as a gold cap would be.

I wish to say something about crowns, bridges and clasp plates. It would be more reasonable to expect three crowns that were fastened on separate roots to stand more crushing strain than a bridge of three teeth used on two roots. This piece of work (indicating) would be a great deal more rigid than if there were three separate crowns. These two teeth would not move in their sockets as much as three crowns individually would. And I would say regarding cases of four tooth bridges, I do not make larger

ones if I can make two smaller ones. I am getting more conservative all the time in regard to bridge work. I prefer small bridges where the case is suitable. I might crown a bicuspid or cuspid and make a clasp in such a manner that I could clasp those teeth and make a partial clasp porcelain plate. The solder that Dr. Ames has given us has made it more practical to do this clasp work.

I will say a word in regard to the setting of crowns. For a good many years I have painted the posts of Richmond crowns, before I began making porcelain crowns, with chloro-percha, and let it dry; then I would cement my crown on, and if it ever became necessary to get that crown off I could remove it very easily by heating. Dr. Taggart has been very ingenious in bringing to the notice of the profession again the use of gutta-percha as I understand it. He fits the gutta-percha onto the post and in the root and gets a proper adaptation first; then he dries the roots out and paints the inside of the canal with cajeput or eucalyptus; then he lets that dry a little and paints the inside of that with chloro-percha; then he paints the gutta-percha on the post with chloro-percha, warms it a little and drives it home. He has this advantage: They are not set solidly as they are with cement, and possibly the gutta-percha preventing a fracture of the porcelain, I do not use this method as much as I would if I did not use the chloro-percha paint as I do. The gutta-percha is not so irritating to the gums as nearly all the cements are, and in these bridges where the saddle comes down so close it is almost impossible to get the cement out just under the saddle. I wish to say here in regard to this part of the saddles, that I usually fill this crevice with body so the food will not lodge in there and cause irritation and bad odors.

I wish to speak just a little about saddles. Dr. Nyman trims his saddles out, as I understand it, something after that manner in bicuspids and molars (indicating). I do not make my saddles after that fashion, like I used to. I trim this down much more and try to get as much porcelain near the gum as possible, from the fact that porcelain is cleaner.

I also have this piece of work that he referred to, showing the construction of this saddle, and I will pass it around for those who wish to look at it.

I wish to say just a word about furnaces. Dr. Nyman was

very kind in his remarks in regard to my furnace. Now, it requires a great deal of knowledge to manage a furnace, especially a gas furnace. While I am an advocate of my own furnace in my own hands, I must say that without any instruction a great many of you would be at sea with it. In regard to electric furnaces. There are a great many electric furnaces that do good work, but there are deficiencies in nearly all of them. They are all very good, and this particular case here was baked in Dr. Custer's furnace. I have baked in nearly all of the furnaces and they all give a good surface. I would like to suggest to furnace makers that some man invent a furnace that has a porcelain muffle and has a time arrangement. Dr. Taggert has a very ingenious arrangement, but it is not on the market. I wish to say that in all the other furnaces, the gold test is the best I know of.

You cannot bake porcelain haphazard and get the same results each time unless you have the same test. Each time you will have quite an assortment of colors and conditions from the same material.

Dr. W. V-B. Ames, of Chicago: I would like to say a few words in behalf of my friend Dr. Custer, who was obliged to go away. From what Dr. Nyman said about porcelain furnaces, in speaking of the furnace of the Custer type, I think he must have drawn his conclusions entirely from the furnace of the Custer type which is in the office of his neighbor, Dr. Bryant, which is a furnace made by an individual named McBryer, and is an imitation of the Custer furnace. But Dr. Nyman is apparently not familiar with an up-to-date Custer furnace, in which there is almost no clay over the wire, and the difficulty of repair is very slight indeed.

There was something spoken of by Dr. Schwartz which I think ought to be corrected; i.e., that with the platinum-gold alloy, used as solder, he can fill in a cap solidly without having danger of its getting out of shape in the furnace. I must say that my one disappointment in the using of platinum and gold mixture is that you cannot fill a cap like that and have it retain its shape. My experience has been that this solder is very valuable for securing joints, but if used for filling in cusps or flowing in any considerable thickness over an extensive surface the platinum matrix is pretty sure to change form.

It is unfortunate that it becomes necessary from the lack of time and amount of unfinished program to choke off the discussion

of so important and practical subject as this. It is to be hoped that, with our programs in the future, there will be fewer papers or the time will be husbanded in such a way that the late papers can be subjected to a reasonable amount of discussion.

Dr. Nyman (closing discussion): The band, the cap and the post all have their share in standing the strain, and, as Dr. Schwartz emphasized in his remarks, the post takes the most of it, merely utilizing the band to prevent fracture of the root and prevent secretions working in and destroying the joint. My reason for putting heavy caps on my bands is that in so doing you have a cap that is strong, that you can submit to rough handling without getting out of shape. I invest my piece before I put in my cross beams, and when I put them I force them in so that I could take the investment and throw it ten feet and they would not fall out; and if I had a thin cap on there I might do this in forcing it in (indicating on blackboard). The investment is largely plaster, and plaster gives a little. Suppose I was going to fit an iridium-platinum bar across there and I started to force that in; if I had a thin cap on there I would be very apt to force that over here, so that my post would be at about that angle when I got through (indicating), because this cap here would not have sufficient strength, and the plaster itself might yield a little bit under the pressure that I exert in forcing the beam into place.

Now, in regard to timing an electric furnace and then simply running it a given length of time. That is a misleading procedure. The platinum wires in an electric furnace undergo an electro-chemical disintegration. My electric furnace when I first bought it fused Close's body in nineteen minutes. Shortly before it burned out it was taking twenty-nine minutes to get the same result, so if I had kept up just running that furnace nineteen minutes the last ten or eleven times I baked in that furnace I would not have had my porcelain fused.

There is another reason why I make a saddle like I spoke of, and that is simply this: That you have that saddle placed accurately on the gum. One reason why you have trouble under the saddles of bridges is that they impinge so close upon the gum as to shut off the circulation, and one of two things occurs—there is either unhealthy granulations at the side nearest to the source of the circulation, right at that point where the circulation is shut off, or atrophy of this whole piece, and it will shrink away. If you

will observe the method I spoke of, of burnishing in this little piece of lead, you will get a nice, even adaptation of your saddle when you get through, but still you should always try these in before you go on with your work.

It was very kind of Dr. Rohland and the other gentlemen to compliment me on my original methods. All of them were not original, however. The borax and the silex methods were not original, but I merely wanted to emphasize them, and to demonstrate what could be done, because I do not believe the profession in general knew of it.

I appreciate all that has been said by Dr. Schwartz in regard to the necessity of making experiments in regard to the lateral stress; but it has only been within the last month or more that I have been asked to prepare this paper, and I have had very little time outside of my practice to attend to it. I do hope to continue the experiments and let you know something definite as regards the stress and conditions as they are met in the mouth.

One other thing. One of our greatest troubles with porcelain work is that very few of our cases are fused accurately, so that we do not get all the strength that could be had in the porcelain, and I hope to give you later on a very simple method whereby you can tell absolutely when you have your porcelain fused right.

CONSERVATISM IN ORAL SURGERY.

By Truman W. Brophy, M. D., D. D. S., Chicago, Ill.

Surgery of the oral cavity and its adjacent parts, including facial deformities, will ever be of great interest to the surgeon, as it not only requires high skill of the diagnostician, but unusual delicacy in manipulation is demanded in order to obtain good results and avoid conspicuous cicatrices and other deformities of the mouth and face.

It is my purpose to briefly state some of the reasons why the surgeon who has been thoroughly educated not only in medicine, but dentistry according to the curriculum of the modern dental college, is especially well qualified to enter upon the practice of this branch of the healing art.

It is customary for the general practitioner of surgery, when operating upon the maxillary bones or in the performance of operations within the mouth, when of considerable magnitude, to make external incisions in order to gain access to, and a full view of, the field of operation. I hold that these external incisions, followed as they are by the formation of scars, are in a large majority of the cases in which they are made wholly unnecessary. For example, a patient suffering from persistent neuralgia of the second or third division of the fifth pair of nerves, having undergone internal medication extending over a period of many months with only temporary relief, is taken by the physician to a surgeon for diagnosis and treatment. The surgeon decides that a nerve lesion exists and that an operation is required or indicated. The patient is prepared, the operation is proceeded with, and an external incision is made in accordance with the location of the lesion. If of the inferior dental nerve, the incision is made along the border of the jaw, the tissues are reflected up so as to expose the external surface of the inferior maxillary bone, a mallet and chisel are made use of; the bone is chiseled away so as to expose the inferior dental canal, and the nerve removed. A saw is sometimes employed instead of a chisel for the purpose of removing the

external layer of bone covering the canal. The wound is closed by suturing and the patient cared for antiseptically until the wound heals.

These external incisions are wholly unnecessary as the operation may be successfully performed within the mouth with a moderate incision over the mental foramen, a small incision being made downward from the mental foramen, so that the canal may be entered with a silver probe. Then a drill, after the form of Gates' root canal drill, exaggerated in size, may be carried into the canal and the contents thoroughly removed.

In order that the nerve may not redevelop as it is inclined to do the canal may be drilled out so as to freshen the surface of the bone, thus causing the exudate to take place from the freshened bony surface, and the consequent filling of the canal with bony tissue. Experience has taught us, however, that the canal does not always fill with osseous tissue and the nerve will be reproduced in certain cases.

I am of the opinion that there is no more reason for making an external incision for the removal of the inferior dental nerve within the substance of the maxillary bone than there would be to make an external incision through the cheek to obtain access to a third molar tooth for the purpose of entering the pulp chamber and removing the pulp therefrom.

Abnormal conditions of the second division of the fifth pair of nerves, or the infra-orbital nerve, frequently require surgical operations for their cure. It has been customary in performing these operations to make external incisions for the purpose of entering the infra-orbital foramen and making exsections of the nerves. I have found that equally good results may be obtained by raising the cheek, making an incision over the cuspid tooth, dissecting up the soft parts, seizing the nerves with a tenaculum as it makes its exit from the infra-orbital foramen, carefully dissecting out its branches distributed to the cheek, thence increasing the size of the infra-orbital canal by means of a drill, seizing the nerve, drawing it forward, and dividing it, will accomplish the same end that may be gained by making an external incision.

Operations for the removal of tumors of the oral cavity of various kinds may also be performed without external incisions. The tumor known under the name of epulis, occurring as it does about the margins of the gum, but having its origin in the periosteum, grow-

ing sometimes to an enormous size, may be removed in all cases within the mouth without external incisions.

The method of procedure in removing tumors of the superior maxillary bones, has been to make an incision usually either through the median line of the lip to the septum of the nose, thence around the ala of the nose to the inner canthus of the eye, thence to the outer canthus of the eye, dissecting up the cheek; reflecting it backward, or to carry an incision from the angle of the mouth to a line midway between the lobe of the ear and the angle of the jaw, and then to proceed to remove the superior maxillary bone together with the tumor through the incision made. I have found that such a procedure in a large majority of cases is unnecessary. Tumors, especially of the sarcomatous, or carcinomatous type, by no means always affect the bony tissue of the hard palate except by absorption of that bone by contact and pressure. Especially is this the case in the formation and development of giant cell sarcoma, a tumor so frequently met with in and about the oral cavity.

Three times during the past four months have I found growths of this character involving the nose, all the space occupied by the antrum of Highmore extending back into the sphenoidal fissure from which they often have their origin, and I have successfully removed them by making incisions within the mouth, over and immediately beneath the malar process of the maxillary bone, carrying them forward to the median line, dissecting the tissues away and thus reaching the great mass of the growth. With properly formed and suitable sized curettes these growths were removed, and the parts, so far as time would allow us to judge, have assumed a normal condition, as there has been no recurrence to date of these growths, in any one of the three cases referred to. In one case in particular a marked absorption of the maxillary bones had occurred, leaving only the soft parts between the oral surface of the soft palate, and the tumor lying upon its superior surface. So extensive was the destruction of the bone in this case that that which was the summit of the vault was depressed or carried downward by the tumor so as to be on a line with the occluding surfaces of the teeth. In order to make this operation without the loss of the teeth, and without the loss of the palate, it became necessary to construct a splint of metal, made by swaging it with dies, so as to make it fit the surface of all the teeth of the upper jaw. This splint was cemented into place, the patient dismissed until the

following day, when the operation was made of removing the tumor. The teeth were so loose that some of them might easily have been removed by the fingers. The splint, however, supported and held them firmly in place, and the tumor was removed. While the cavity has not yet filled, the parts are in an apparently healthy condition, and the teeth have become quite firm. This dependent part of the palate, caused by the pressure of the tumor, contracted and finally resumed its former shape. The palate is restored, and the articulation of the patient is in no sense impaired. If, however, the usual course of operative interference had been adopted, the patient would have been deformed through life.

In cases of osseous tumors, involving the greater portion of the maxillary bones, it is often expedient to remove them without external incisions. The superior maxillary bone may be removed within the mouth and without any external incision whatever. Necrosis and caries of the bones may be removed easily within the mouth. On several occasions I have removed one-half of the inferior maxillary bone without external incisions. In a case of necrosis I removed the entire inferior maxilla within the mouth. This, however, was a comparatively easy procedure as there were no attachments that were difficult to release. It is needless to say that tumors of the lower jaw may be more easily removed than tumors of the upper jaw, as better access to them through the oral cavity can be secured. It may be well to urge upon all the great advantages to be obtained in the treatment of fractures of the maxillary bones by the adoption of internal splints. The skilled dentist, whose ability to manipulate metals in the construction of regulating appliances, crowns, etc., is especially well adapted to the construction of apparatus or splints for the successful treatment of fractures of the maxillary bones. The application of external splints and bandaging, even when most skillfully applied, is very inefficient in accomplishing the work desired in securing a good adaptation of the fragments and restoration of normal occlusion of the teeth.

I wish to make a plea for conservatism in oral surgery. It is true that we meet with cases, now and then, of such a character as to make external incisions a necessity, but I feel that it is the duty of every operator to consider the best interests of his patient before operating, and in all cases, where it is possible to do so, to operate within the mouth, and thus avoid the formation of scars which will be a disfigurement to the patient through life.

EXPLANATION OF THE OPERATION PERFORMED BY DR. BROPHY.

Dr. BROPHY: Those of you who witnessed the operation I performed this morning observed that an external incision was made. I might have made an incision at the distal surface of the ramus of the jaw in the region of the inferior dental foramen and removed the nerve in that manner, but I would not have obtained the perfect access to the nerve that I did by making an external incision and removing a portion of the ramus of the jaw. In this case I found that the nerve was enlarged to an enormous extent. Had it been a younger patient, I would have proceeded and reamed out the inferior dental canal in the usual way. Conditions necessarily modify our treatment. The case which I had this morning was by no means a promising one—a man aged seventy-five years, with a feeble heart with now and then cessation of pulsation. The result up to date, which has been but a few hours, is even more successful than I expected. He has had no pain since. He declares it is the first time for fifteen years that he has had immunity from pain for so long a time. I feel that he will make a good recovery and hope he will live many years in ease and comfort.

DISCUSSION.

Dr. R. N. LAWRENCE, of Lincoln (opening discussion): The paper offers no room whatever for criticism, only the highest possible commendation. It presents to our view another link in the chain of progress, presented by one of our own number of whose achievements we are justly proud. Any dentist who has been in practice for twenty-five years will have no trouble in remembering that but little attention was paid to diseased conditions, abnormal developments and malformations of the jaws and teeth prior to that time. That fact was brought vividly to my mind during that grand meeting held in Chicago in February last. As I sat in the presence of the writer, witnessing most remarkable operations in oral surgery, I said to myself, "The progress made by such men as Brophy, Gilmer and Marshall in this department is simply wonderful." And if you will permit me here in my remarks to include the progress made in other departments by men like the essayist, who, while following general practice, take up a specialty to which they devote especial study, cultivating their powers to a high degree. Such men, in my opinion, have done more to lift us out of the murky atmos-

phere of the past than the so-called general practitioner, and as a consequence, a new era of public usefulness has dawned for our profession. The knowledge and skill attained by these men and so freely presented to us, enables us to step outside the bounds of ordinary routine work and with greater skill restore to health, mouths diseased, and organs shorn of their functions. But this is not all; in addition to this, Drs. Brophy and Black and their coworkers have succeeded in building up within our borders the finest dental schools on earth. The fact that we possess a Brophy and a Black and a Harlan and a Duke of York, and that we can be Cased and all our Angles reduced and be made Younger by implantation and artistic treatment, shows how progressive we are.

Dr. T. L. Gilmer, of Chicago: After the eloquent address I have just listened to I fear what I may say may seem common place. I can only second and emphasize what Dr. Brophy has said. Certainly there has been a great gain since surgery of the face and mouth has been, in a measure, relegated to oral surgeons. This reminds me of what was said to me by one of the best surgeons in Chicago not long ago. I called him in to see a case of caries of the superior maxilla. I had removed the entire right half of the superior maxilla, which had been destroyed by caries. After removing it I packed the part with gauze, and to retain it brought the two edges of the gum together and sutured them. I opened up the stitches and removed the dressing, and he examined the case and found the immense cavity from which the bone had been removed. "Well," he said "oral surgeons are certainly making progress; cosmetic effects are not thought so much of by the general surgeon, he probably would have cut through the soft parts and removed the bone through an external opening." Regarding the external incisions, there are some cases that demand them, but, of course, we should not make external incisions if it is possible to avoid them, but conditions alter the cases. In the first place, it is more difficult to operate in the mouth; then we cannot make an aseptic operation in the mouth; besides, the presence of the blood, saliva and mucus add to the difficulties. Then there are difficulties in controlling the anæsthesia. There are conditions where it is desirable for the cure of neuralgia to remove a larger portion of the nerve from the lower jaw than can be done conveniently from the inside of the mouth, especially in such a case as the one Dr. Brophy operated on this morning. I have done this in several different ways. I have made the Garretson operation. It is made by making an incision in the soft parts of the base of the jaw in the shadow line. The soft parts

are turned up and two parallel incisions are made in the bone about three-sixteenths of an inch apart, extending from the mental foramen back. This is an easy method of removing a section of the nerve, and with our present means of suturing, using only a few of the larger and stronger sutures, and quite a number of horsehair sutures, and by the present means of thorough aseptic surgery, I have been able to get results which leave practically no scar whatever, only a very slight line under the base of the jaw which is ordinarily observable even on a woman's face for whom I performed it. A better operation, perhaps, and one less difficult than the one which was very skillfully employed by Dr. Brophy this morning, which I have performed, is made as follows: An incision is made just underneath the angle of the jaw, the parts are reflected from the bone until the posterior dental foramen is reached. The only difficulty that we have in securing the nerve is that we are not able to see quite so well, with this sort of an incision, but I have found that by using a mouth mirror, after the parts are retracted, we can see the nerve perfectly with it as it passes out from the posterior dental foramen, and then by having a properly shaped tenaculum we can slip it underneath, and pick up the nerve and draw it out of the bone, and then proceed up in the direction of the Gasserian ganglion, removing it as far up as we desire. I think we can get it out as far up that way, and with perhaps less labor, than we can if the cut is made through the ramus, and it leaves a very trifling scar, if we have done the operation under aseptic conditions. This is the operation of a German surgeon whose name has slipped my memory.

Dr. J. E. Nyman, of Chicago: I think that it is very seldom that due credit is given to oral surgeons for the difficulties under which they work, and I think that, on the whole, to be a good oral surgeon requires more skill than it does to be a good general surgeon. I once heard a very prominent general surgeon admit that very point. He had just gotten through a cleft palate operation on a young child, and wiping the perspiration from his brow, he said, "Talk about a herniotomy in a fat man, it is not in it with a staphylorrhaphy in a fat baby."

Dr. Brophy: The hour is late, and I have nothing to say except to express to the ladies and gentlemen present my appreciation of the attention which they have given me, and to thank the gentlemen who have so highly complimented my methods of operating.

THE ESSENTIAL OILS AND SOME OTHER AGENTS, THEIR ANTISEPTIC VALUE, ALSO THEIR IRRITATING OR NONIRRITATING PROPERTIES.

By A. H. Peck, M. D., D. D. S., Chicago, Ill.

Very soon after assuming the duties of the chair of materia medica and therapeutics in college work, I became convinced that in our literature there was much loose statement in regard to the action of the drugs we employ in dentistry. Especially did this seem true in regard to the antiseptic powers of various agents employed as antiseptics. Further, the therapeutic action of these agents has generally not been especially considered. It seems that iodoform is still used by many as an antiseptic, though it has long been known that it has not that power. Also, that the presence of albumin renders the ordinary solutions of bichloride of mercury inert as to antiseptic power, and prevents its effectiveness in treating suppurative surfaces, yet it is persistently used for this purpose. Also, the essential oils, some of which have previously been shown to possess antiseptic virtues have seemed to be looked upon as a group of antiseptics, and, as it has seemed to me, are being used without reference to their relative merits as antiseptics, or to their therapeutic effects upon the tissues to which they are applied. For these reasons I have, in my teaching in the Northwestern University Dental School, made trial of these agents in the bacteriological laboratory, as to their effectiveness as antiseptics, and have also in various ways made trial of their effects upon the animal tissues in order that I might speak definitely of my own knowledge of these matters. In this paper I will give briefly my observations upon a number of these agents.

To determine the antiseptic value of these agents the following experiments were conducted: Test tubes, each containing ten c. c. of sterilized mutton bouillon, were used. The broth in these

tubes were, for the most part, infected with saliva from various members of the class. In each set of plants made, a control tube was used, i. e., a tube in which the broth was infected with saliva, but into which no antiseptic agent was placed, simply to act as a control for the results of the remaining tubes into which antiseptic agents were placed. In each instance the control tube presented a full development of bacteria, thus proving the accuracy of each set of plants. One drop of the essential oil was first used in the tubes. When one drop prevented development of bacteria, the quantity was gradually decreased in other plants, until the least amount that would prevent development was ascertained. To divide the drop I placed ten drops of alcohol in a small vial, and into this placed one drop of the oil; the alcohol dissolves the oil immediately. I then used in the culture tube such proportion of the drop of the essential oil desired, one drop of the solution representing one-tenth of a drop of the oil. Those drugs that were found ineffective with one drop were increased in other plants until found effective, or were given up as unsuitable, or worthless as antiseptics. The same dropper was used throughout.

An antiseptic must be regarded as a poison to the vegetable cell, and many of them act also as poisons to the animal cell. I undertook this series of experiments for the determination of these differences of poisonous effects with the idea that in selecting antiseptics for use in practice we should have special regard to the effect of the agents upon the animal tissues to which they are applied. To determine the irritating or nonirritating properties of these oils an extensive course of experiments with them has been conducted during the winter months, in connection with sores artificially produced on guinea pigs, and also on my own person. To determine the effect of these agents when applied directly to soft tissue the applications were made, in each instance, to my own person. And pardon me when I say that I believe I have come to positive conclusions regarding some of these agents along these lines.

Oil of cassia. We find that three-tenths of a drop is the smallest quantity that will prevent the development of bacteria in ten c. c. of broth, and there being sixty-seven drops of oil of cassia in one c. c., this agent is effective as an antiseptic in 1 to 2,233 parts, that is to say, one whole drop of oil of cassia would prevent develment of bacteria in 2,233 drops of infected broth. This explana-

tion, if you please, will hold good in connection with each agent I have used. Oil of cassia is undoubtedly the most potent of the essential oils as an antiseptic. I have had at least a dozen samples of cassia, obtained from as many different sources, and upon analyzng them have found them to be adulterated in each instance. One sample, especially, shipped direct from China to a dealer in Chicago, was found to contain fixed oils in considerable quantity. Others were found to contain alcohol, etc. This oil, as found in commerce to-day, is not as potent an antiseptic, by about one-half, as was the cassia obtained ten years ago. A reference to the work of Dr. G. V. Black along this same line, done about ten years ago, serves to prove the correctness of this statement. The samples of cassia he used at that time were potent in 1 to 4,000 parts. If I could have obtained a pure, unadulterated sample of cassia it would certainly have outclassed oil of cinnamon as an antiseptic by a wide margin; but as it is, as to the division of a drop, they have proven exactly the same. However, you will notice when we consider that agent, that of oil of cinnamon only sixty-three drops are required for one c. c., while of cassia sixty-seven drops are required. This simply means that one drop of oil of cinnamon is just slightly larger in bulk than one drop of oil of cassia, so that this discrimination in the number of drops to the c. c. still places oil of cassia ahead of oil of cinnamon as an antiseptic, the potency of oil of cinnamon figuring out 1 to 2,100 parts. While oil of cassia stands at the head of the essential oils as an antiseptic, it is also true that it is the most poisonous in its effect upon soft tissue. As a test of the irritating properties of oil of cassia, a pellet of cotton was saturated with it and placed in a small rubber cup, to prevent evaporation. This was applied to the surface of the skin and held there by means of a piece of court plaster large enough to cover it over and stick tightly to the surface of the skin about the edges. This was retained in place for twenty-four hours, during which time the irritation to the soft parts was by no means a pleasant feature. At the end of this period a blister invariably forms; however, the inflammation in the tissues at this time is not very great. The blister will occupy an area from one-half to one-third greater than that to which the oil is directly applied, and will fill and refill with serum several times before any tendency to recovery is noticed. At the end of forty-eight hours the inflammation in the parts involved is intense, and occupies an area four or five times

as great as that to which the oil is directly applied. Numerous small, independent blisters almost invariably form about the circumference of the inflamed area. This condition continues for several days, and while the inflammatory process is at its height the sore is one of the ugliest and most formidable in appearance it has ever been my privilege to look upon. These sores, also, are very slow in healing. It is with seeming regret on their part that the inflammation is permitted to subside, and the parts to return to a normal condition. While these sores are in every way just as bad as has been described, they are, however, fraught with no serious consequences.

To further test the irritating properties of this oil, a sore, in connection with which there was considerable inflammation, was produced on a guinea pig and treated for a number of days with the spray of cassia, by means of an atomizer. So long as this treatment was continued the parts could not recover, but quite to the contrary, the inflammation was greatly increased. Suppuration was then produced by infecting the sore with pus microbes. This in turn was treated with the spray of cassia, with the result that the germs were destroyed, and the pus formation caused to cease, thus proving quite conclusively that this agent is an excellent germicide when applied to suppurating surfaces, as well as a most potent antiseptic.

To my mind, it is clearly proven that while the antiseptic and germicidal properties of this oil are of the highest order, it is one of the most irritating, in its effects on soft tissue, of all the agents with which we have anything to do. And because of these effects, as outlined above, I feel perfectly justified in making the statement that oil of cassia should never be used as a dressing in the root canals of teeth.

There is also another reason, aside from the above, why it should not be used, and that is, its proneness to cause discoloration of the teeth. In almost every instance in which its use is continued for a time the teeth are more or less discolored, and in some cases very considerably. This is one of the most difficult forms of discoloration to correct that we are called upon to treat.

Is it not reasonable to suppose that when cassia is used in the treatment of pulpless teeth, the above disagreeable conditions may occur in the soft tissues occupying the apical space and the peridental membrane become involved in the inflammatory process?

Have you ever thought that the excessive flow of serum which so frequently occurs from the tissues of the apical spaces of teeth that are being treated with this oil, is nothing more or less than the discharge of actual blister, as in the cases above recited? If these are reasonable suppositions—and I believe they are—is it still a source of wonder to any of you that teeth, under these circumstances, so suddenly develop such extreme tenderness to pressure, as they frequently do?

Oil of cassia, however, has a place in our practice as dentists. Cassia water, sometimes, in the treatment of fistulous abscesses, is very useful. It is so stimulating to the tissues that it excites a healthy action on the part of the latter when other agents fail. Oil of cassia in the treatment of severe cases of pyorrhœa, so-called, where the pockets about the teeth are deep, and considerable pus present, is exceedingly useful. In such cases it may be used in full strength by means of a drop syringe. The oil is not permitted to remain in contact with the soft tissues a sufficient length of time to cause trouble, it is so soon diluted by the fluids of the mouth.

Oil of cinnamon of Ceylon. We find that three-tenths of a drop prevents development of bacteria in ten c. c. of broth, and that sixty-three drops constitute one c. c., thus showing this agent effective as an antiseptic in 1 to 2,100 parts. Oil of cinnamon of Ceylon, as you well know, is very much the same nature as oil of cassia. However, in some respects there is a marked difference between them. It has been demonstrated that oil of cinnamon is not so irritating to soft tissue as oil of cassia. An application of oil of cinnamon to soft tissue, in the same manner that cassia was applied, and left for twenty-four hours, caused considerable irritation, and formation of blister. At the end of forty-eight hours the inflammation was severe; however, not so intense as that caused by cassia, and the area of tissue involved in the inflammatory process was not so great. Also, the blister that developed by the application of cinnamon was by no means as large as that from cassia, occupying the center of the inflamed area and spreading over tissue in extent equal only to that to which the agent was directly applied. The blister and inflammation are not so persistent as is the case with cassia, the former refilling with serum usually but two or three times, and the inflammation passing away quite readily.

A sore on a guinea pig, attended with much inflammation, was

treated with the spray of oil of cinnamon with the result that it was further constantly irritated and thus prevented from healing. Suppuration was then produced in the sore, and again treated with the spray of this oil—the germs being destroyed and the pus formation ceasing. The action of cinnamon was not so vigorous as that of cassia.

To my mind, cinnamon is altogether too irritating for use in the treatment of pulpless teeth.

A synthetic oil of cinnamon,* a sample of which I secured this spring from the first lot sent to this country (it being prepared in both France and Switzerland) proves to be as potent an antiseptic as the regular oil, three-tenths of a drop preventing development of bacteria in ten c. c. of broth. Sixty-four drops of this oil constitute a c. c., thus showing it effective as an antiseptic in 1 to 2,133 parts. It is, however, in its first effects more irritating to soft tissue than oil of cassia. An application was made to soft tissue, and at the end of fifteen hours a fully developed blister, in extent larger than the area of tissue to which the oil was applied, was the result. There was very little inflammation or discoloration of the tissues. The first effect of this oil on soft tissue was so vigorous, very much tenderness and inflammation were confidently expected to follow. In this, however, I was disappointed. The blister continued to refill with serum several times, but actually no tenderness or inflammation worthy of mention developed in the surrounding parts. I cannot recommend it for use in the treatment of pulpless teeth.

Beech wood creosote is the next agent, from point of potency, as an antiseptic; five-tenths of a drop prevented development of bacteria in ten c. c. of broth. There are sixty-four drops in one c. c., thus showing creosote effective as an antiseptic in 1 to 1,280 parts. This agent is practically nonirritating to soft tissue. An application remaining for a period of thirty-six hours produced practically no irritation. There was just the slightest evidence of irritation about the center of the spot where it was applied. There was no inflammation. The surface of the skin was slightly discolored and also slightly burned or seared over, but not to an extent that caused the loss of any tissue. A sore on a guinea pig was treated with the spray of creosote with the result that the inflammation gradually subsided, and the sore healed with little delay.

Another sore in which suppuration was produced was treated in a like manner, the germs being readily destroyed and the pus formation stopped. Continued treatment resulted in the gradual healing of the sore. Creosote has proven its right to stand among the first, from point of potency, as an antiseptic, and because it has been demonstrated that it is practically nonirritating to soft tissue, it is a safe agent, and in some cases a very desirable one, for use in the treatment of pulpless teeth. A case of putrescent pulp, for instance, of long standing, one in which the lateral openings and also the dentinal tubules are completely saturated with mephitic odors and gases, creosote, in my judgment, is the most potent and desirable of the available agents. It is very penetrating, and one of the most persistent in its effects of all the agents at our command. I have used it to good advantage in severe cases of apical pericementitis. However, in some instances, where discoloration of the teeth has occurred, it has seemed that it was due to the action of the drug. Creosote being more or less of the nature of carbolic acid, possesses to a certain extent the properties of a local anæsthetic, and because of this property it has quite a beneficial effect upon inflamed tissue.

Oil of cloves. Six-tenths of a drop prevented growth in ten c. c. of broth; sixty-nine drops constitute one c. c., showing it effective as an antiseptic in 1 to 1,150 parts. Oil of cloves is absolutely nonirritating to soft tissue. An application to the surface of the skin for thirty-six hours left no more evidence of having been confined there than so much sterilized water would have done. No irritation, no discoloration. Sores were produced on guinea pigs and treated with the spray of this oil. The inflammation subsided more rapidly than when treated with any other agent, and the sores healed as readily as they could, simply proving beyond any possibility of doubt that, while effectively destroying microbes, the only action of oil of cloves in contact with irritated, inflamed soft tissue is that of a quieting, soothing agent, serving to reduce the irritation and inflammation, and returning the disturbed tissue to its normal condition. A sore in which suppuration was produced by being infected with pus microbes was treated with the spray of this oil; the germs were destroyed, and the formation of pus was stopped.

A sore on my arm, produced by an application of cassia, became infected and pus formed. This was washed thoroughly

with a 1 to 1,000 solution of bichloride of mercury every night for several times, and dressed in turn with iodoform, nosophen and aristol, with no other result than an absolute failure to stop pus formation. One night, after having washed the sore thoroughly with the bichloride solution, I poured oil of cloves onto the raw tissue. There was only a slight smarting for a few minutes, after which its action was that of a quieting, soothing agent. This application was held in position for twenty-four hours. It was then removed; no pus was present, and the little granulations could be seen springing up all over the surface of the sore. It was immediately dressed with aristol and let alone for forty-eight hours, at the end of which time it was perfectly healed.

Another sore on the lower part of my right leg, the result of an application of formalin, was causing a great deal of trouble. The inflammation was severe, the tissues were very tender, the muscles felt bound up and were very painful, it being exceedingly difficult to walk. Continued treatment with ordinary remedies resulted in no relief. One morning, after having thoroughly cleansed the sore, a liberal quantity of oil of cloves was placed on it, and the bandage applied. Within four hours' time the very disagreeable, drawn condition of the muscles passed away, the pain ceased, and the foot could be moved in all directions as freely and comfortably as could the other, and could be used in walking just as well as it ever could.

Oil of cloves, for general use in the treatment of pulpless teeth, is certainly one of the best agents at our command. It possesses the property of destroying or rendering inert septic and infectious material. In cases of apical pericementitis it is perhaps the best agent that can be used. It possesses local anæsthetic properties to a marked degree, and, like some of the other agents, because of this fact, serves to reduce the inflammation in the tissues in the apical space and causes them to return to a normal, healthy condition.

Oil of bay. Seven-tenths of a drop prevented development in ten c. c. of broth. Seventy-two drops are necessary for one c. c., showing this agent effective as an antiseptic in 1 to 1,028 parts. Oil of bay, to me, is a comparatively new agent, and I believe I am warranted in making the statement that it is a new agent to the vast majority of the dental profession. A year ago last winter a gentleman spoke to me about this oil, said he had been

using it for some time in the treatment of pulpless teeth, and that, so far as his clinical experience went, had found it to be an efficient and agreeable agent. He stated that he had not observed any bad effects along the line of producing irritation, or anything of that sort. He requested that I test it, which I did, with the result above stated, which places this oil in the foremost ranks of the list of antiseptics. I have used it more or less since, and in one case, that I have in mind, thought the irritation and tenderness resulting was directly due to the action of the oil. But in subsequent use, have observed none of these effects. I came to the conclusion that I was wrong, that there must have been some foreign, irritating substance present which caused the trouble. I have made two applications of the oil to soft tissue, retaining each in contact for thirty-six hours, for the purpose of observing its effect, and no irritation resulted in either case.

A sore was produced on a guinea pig with an irritant which caused intense inflammation. This was treated with the spray of bay for several days, and the closest observation did not reveal any additional irritation, but to the contrary, the inflammation gradually subsided. However, not so rapidly or willingly as when some other agents were used—as cloves. A sore in which suppuration was produced, on being treated with the spray of bay, yielded very nicely, the germs being destroyed and the pus formation stopped. I think we are safe in concluding that oil of bay is a valuable addition to our list of agents for the treatment of pulpless teeth. So far, I can see no objection to its use, and it is certainly a most effective agent.

Oil of sassafras. Seven-tenths of a drop prevented growth of bacteria in ten c. c. of broth; seventy drops are required for one c. c., showing it effective as an antiseptic in 1 to 1,000 parts. Oil of sassafras in contact with soft tissue for thirty-six hours produced no evidence of irritation. It has proven to be a very potent antiseptic. I have treated sores, in which there was marked inflammation, with the spray of sassafras, and the result was much the same as with the last previous agents; the inflammation subsiding, the irritation passing away and the sore healing. It has not exhibited the ability to destroy germs and prevent pus formation to nearly the extent that the stronger agents have. I have never used oil of sassafras in the treatment of pulpless teeth, but I certainly can see no reason why it should not be a potent and harmless agent in this connection.

Oil of peppermint. Eight-tenths of a drop prevented development of bacteria in ten c. c. of broth; seventy-two drops are necessary for one c. c., showing this agent effective as an antiseptic in 1 to 875 parts. An application of oil of peppermint to soft tissue continued for thirty-six hours produced no irritation, no discoloration of the skin, no inflammation, thus showing conclusively that this, also, is nonirritating to soft tissue. A sore in which considerable inflammation was present was treated with the spray of this oil, with the result that the inflammation readily yielded, the irritation subsided and the sore healed. Another sore in which suppuration was produced was treated in the same way, with the result that the germs were destroyed, and the pus formation was stopped, which proves that this agent is not only an antiseptic, but also destroys the germs and thus prevents pus formation. This is an agent which I have rarely ever used in practice. Three years ago I used it a little in treatment cases, but discarded it simply because of its persistent, penetrating odor. Other than that, I can see no objection to its use in pulpless teeth.

Dr. Black's "1-2-3." This is the next agent in point of potency. One and four-tenths drops prevented development in ten c.c. of broth; sixty-five drops are necessary for one c.c., showing this agent effective as an antiseptic in 1 to 454 parts. "1-2-3," as you well know, is a preparation given to the profession a number of years ago by Dr. G. V. Black, consisting—the mild solution, so-called, and this is the one used in these tests—of one part oil of cassia, two parts carbolic acid crystals, and three parts oil of gaultheria. It has always proven itself a most efficient agent in the treatment of pulpless teeth, and has been used by very many in the dental profession for the last ten or twelve years, possibly more than any other one agent. I have used it continuously since I have been in practice, and have never observed any bad effects. No irritation to the soft parts, no tenderness of the tooth to pressure, no inflammation resulting. Possibly some of you will wonder why "1-2-3" is such an efficient and desirable agent, consisting, as it does, of cassia, carbolic acid and wintergreen; carbolic acid being not a positive persistent antiseptic, but one whose restraining effects upon the development of bacteria are only transient; oil of gaultheria being absolutely worthless as an antiseptic, and the use of cassia being so thoroughly condemned because of its extreme irritating properties. Of course, this agent

depends upon the cassia for its antisepic properties. The gaultheria is used as a diluent to the cassia. The carbolic acid was used more especially because of its anæsthetic properties on soft tissue. When these different agents are properly mixed to form "1-2-3," it is the opinion of Dr. Black that there is more or less of a chemical union between them, so that the individuality of each separate agent seems to be lost, and the result is the formation of a new agent, or one with different characteristics from those possessed by the three individual agents. At any rate, it is non-irritating to soft tissue. An application left on for thirty-six hours produced no irritation whatever. There was only a slight searing, and discoloration of the surface of the skin. Sores with much inflammation present were treated with the spray of "1-2-3," which did not produce further irritation. Its action was more like that of a neutral agent (so to speak), not irritating the sore, nor, on the other hand, imparting, to any appreciable extent, a soothing, quieting influence, the inflammation subsiding just about as it would if left to itself with all irritating influences removed. A sore, in which suppuration was produced, was treated with the spray of this agent. It demonstrated its right to be classed as a very potent germicide. The germs were destroyed and the pus formation ceased.

"1-2-3," as formed with the present cassia of commerce, is not so potent an antiseptic as that formed with cassia obtainable several years ago. This must be due to the fact stated above, that cassia is so adulterated at the present time. In fact, "1-2-3" is lessened in potency in almost direct proportion to the extent of the adulteration of the cassia.

Seven-tenths of a drop was effective in ten c.c. of broth, as shown by experiments conducted by Dr. Black several years ago.

"1-2-3," as shown by these experiments, is abundantly effective, but if cassia is continued to be adulterated the time may come when it will not be. For general use, in the treatment of pulpless teeth, "1-2-3" is certainly an effective and excellent agent.

Carbolic acid, ninety-five per cent. One and eight-tenths drops prevented development in ten c. c. of broth; sixty-one drops are required for one c. c., showing this agent effective as an antiseptic in 1 to 338 parts. Carbolic acid is not a permanent, positive antiseptic. Its restraining power on the development of bacteria, in

the majority of plants one makes is only transient. One and eight-tenths drops prevented development for a period of three days, after which the bacteria developed in almost every instance. The restraining effect of this agent upon the development of bacteria seemed to be almost in direct proportion to the quantity of the agent used in the culture tube. The use of this agent in dentistry is so familiar I need not dwell on that point.

Oil of myrtol. One and nine-tenths drops were necessary to prevent development of bacteria in ten c. c. of broth; sixty-eight drops constitute a c. c., showing myrtol effective as an antiseptic in 1 to 357 parts. Oil of myrtol is an agent which I have used but litttle in practice. In the majority of cases in which I have used it there has seemed to be more or less irritation produced, more or less tenderness of the tooth developing, so that it impressed me as being somewhat of an unfavorable agent for this purpose. An application of myrtol to soft tissue for thirty-six hours produced decided irritation, and there was a strong tendency to the formation of blister. The surface of the skin was destroyed. The irritation and inflammation present continued for two or three days, gradually abating. A sore on a guinea pig being treated with the spray of this oil, showed evidence of further irritation. So long as the treatment was continued, the inflammation refused to subside. A suppurating sore, being treated in the same way, was certainly benefited by a consequent destruction of the germs and cessation of pus formation. There is no doubt but that this agent is quite irritating, and one that should not be generally used in the treatment of pulpless teeth. There are cases in which I use strong myrtol water, seemingly to good advantage, and these are in connection with abscesses, with fistulous openings, especially those of long standing, in which there is more or less irritation of the soft parts throughout the tract of the fistule, and that uneasy, disagreeable sensation oftentimes experienced by the patient in connection with these cases.

Oil of cajuput. Six drops are necessary to prevent development in ten c. c. of broth; seventy-two drops are required for one c. c., showing this agent effective as an antiseptic in 1 to 120 parts. Cajuput is nonirritating to soft tissue. Applications of this oil to soft tissue, retained for thirty-six hours, produced no evidence of irritation; in fact, the discoloration of the skin was very slight and remained but a short time. A sore on a

guinea pig, in which there was considerable inflammation, was treated with the spray of oil of cajuput, and no increase of the irritation was produced. Another sore in which suppuration was produced was treated in the same way, with the result that the germs were gradually destroyed, its action, however, not being very positive, for if the treatment was discontinued for a day or two the pus formation continued as before.

Oil of cajuput is an agent which I have never used very extensively in my practice. At first I did use it more or less in the treatment of pulpless teeth, but latterly I have not used it in this connection; in fact, the only use I make of it is occasionally to moisten the inner walls of the root canals previous to filling with gutta-percha. For this purpose its nonirritating nature recommends it, and especially the fact that it is a solvent of gutta-percha and causes the latter to adhere to the walls of the canals.

Eucalyptol (*Sander's and Merck's*). Six drops of each of these preparations are necessary to prevent development of bacteria in ten c. c. of broth; seventy drops are necessary for a c. c., showing each preparation effective as an antiseptic in 1 to 116 parts. Eucalyptol in contact with the skin for thirty-six hours produced no evidence of irritation, no inflammation, no discoloration, thus proving that the agent is nonirritating and harmless in contact with soft tissue. A sore in which considerable inflammation was present was treated with the spray of this agent with the result that the inflammation readily yielded, the irritation subsided, and the sore healed, thus further proving that it is nonirritating even to injured, inflamed soft tissue. A sore in which suppuration was produced was treated in the same way, with virtually the same results as with cajuput; it exhibited a restraining influence upon the development of bacteria and pus formation, but the treatment being discontinued for a while, pus formation went on as before. As an agent to place in the root-canals of teeth after the removal of a pulp, following devitalization, in order to keep the parts healthy for a few days previous to root-canal filling, it is perhaps the agent that I use more than any other. It is certainly harmless, never exciting irritation. For the purpose of slightly moistening the inner walls of canals previous to root-canal filling, eucalyptol is the agent that I nearly always use.

The oil of eucalyptus, as found in the market, only produced a restraining effect upon the development of bacteria when a saturated solution was formed with the bouillon.

Oil of gaultheria was carried in my experiments as high as eight drops, this quantity forming a saturated solution in the ten c.c. of broth, that is to say, the broth had taken up, or dissolved, all of the oil that it could possibly retain, there being also a large number of free globules floating about in the broth, and still development of bacteria took place quite abundantly, showing that this agent is useless in restraining the development of bacteria. It is certainly of no use to us as an antiseptic.

Eugenol. This agent resulted in the same way as gaultheria. Eight drops were used in the ten c. c. of broth, which amount formed a saturated solution with numbers of globules of the free oil floating about, and still the bacteria developed, thus proving that eugenol also is useless as an antiseptic.

Formalin. Of late the dental profession has taken up this agent for the treatment of pulpless teeth, the treatment of abscesses and for devitalizing pulps, etc., and many are reporting wonderful results from its use. Not long since I read an article in one of our journals in which the writer paid a glowing tribute to this agent as a most efficient and desirable one for the treatment of nearly all conditions of pulpless teeth. Having had some experience with it myself, and because of many negative results experienced, having had my suspicions aroused as to whether it was a proper agent to be used about the mouth, I decided to investigate it as thoroughly as possible. First I tested it as to its antiseptic properties, and found it to be quite a powerful antiseptic. Of the formalin preparation, which is a saturated solution of the gas formaldehyde in water (the latter taking up about forty per cent of the former), four-tenths of a drop prevented growth of bacteria in ten c. c. of broth; fifty-six drops are necessary for a c. c. This shows formalin potent as an antiseptic in 1 to 1,400 parts. Somebody has been so enthusiastic over this agent as to make the statement that it is fully as potent an antiseptic as is bichloride of mercury. This is certainly a mistake. I prepared a 1 to 1,000 solution of bichloride of mercury and found it required nine drops of this solution to prevent development of bacteria in ten c. c. of broth. I prepared a 1 to 1,000 solution of pure formaldehyde, which we have now in a solid state—the gas being reduced to such by chemical processes—and of this solution found that it required forty drops to prevent development of bacteria in ten c. c. of broth, thus proving that formaldehyde is not so potent an antiseptic

as bichloride of mercury, by at least fourfold. I next resolved to determine its ability to irritate soft, animal tissue—the same as I did with the other agents. I took a small pellet of cotton, saturated it with formalin, placed it in a small rubber cup to prevent evaporation, placed it on the surface of the skin on the lower part of my right leg, and covered it over with a large piece of court plaster stuck tightly about the edges. This was placed there the 14th day of last March, at 12:30 A. M. I went to bed and went to sleep. Between four and five in the morning I was awakened by the pain, and could get no rest after that. The pain was quite intense, and of a very peculiar character. It seemed as if something were inside my leg gripping it as if in a vice. Then it would take a turn and twist about, as if tearing the inside out. It would stop for an instant, and then the performance would be repeated with renewed vigor. The pain continued more or less severe all day. I wanted to keep the application in place for twenty-four hours—the time adopted for the other agents—but at the end of twenty hours, the pain had been so constant and the tissues began to look so ugly, that I concluded to remove it. The tissue to which it was applied and for about two inches in all directions was turned as white as pure snow, as if all the blood were driven from the parts. The pain was lessened very considerably within a short time after the application was removed. The tissue to which it was directly applied was perfectly anæsthetized to a considerable depth. Just at the circumference of the application there was considerable tenderness. There was much swelling, which seemed to be more like that of œdema than of true inflammation. In about two or three days some color began to return to the parts, except to which the agent was directly applied, which latter never regained its normal color. In about two days more a line, purple in color, began forming at the circumference of the point of application—a line of demarkation—and it became apparent there was to be a break in the tissues. This break occurred, and sloughing took place; considerable tissue was lost all over the surface of the inflamed area. The tissue in the center raised about the edges, but was very obstinate about coming away. From the time the agent was thoroughly absorbed in the tissues, physically I was not up to the standard; my appetite was more or less impaired; the digestive and eliminative organs were somewhat interfered with. These conditions continued to grow worse until the climax came

in the form of quite a severe case of systemic poisoning, the poisonous matter being thrown off through the medium of a severe diarrhœa, and also much vomiting—the former continuing for a period of three days, the latter for one day, following which time my physical condition rapidly improved.

Having seen a number of cases that have been treated by physicians with various per cent solutions of formalin in which more or less sloughing of the soft parts has resulted—one which I saw not long since in which as low as a two per cent solution was used, in connection with which considerable sloughing resulted—and also because of the very vivid recollections of my own personal experience with it, I have come to the conclusion that we should get along without it in the treatment of diseased conditions about the mouth.

As I have devoted a paper to this agent before another society, I will not give my observations of it in more detail here. My paper is now too long for me to consider the subject of the selection of antiseptics with a view of utilizing their therapeutic effects in individual cases in connection with their antiseptic powers, but this can be fairly made out from the observations related.

DISCUSSION.

Dr. G. V. Black, of Chicago (opening discussion): It is pretty difficult to discuss a paper like this. It is rather a paper for us to take home and study at our leisure, to read and read again and draw from it guidance in the selection of drugs to use. It has dealt with drugs with which we have been familiar for years, and yet has presented phases of these drugs that will be new to many of you, perhaps; over and over again I have been surprised at the choice persons have made of the essential oils for certain specific purposes. I have studied these oils pretty closely myself, their antiseptic properties and their therapeutic properties, but never in such a manner as they have been presented to you this evening. I have known well that oil of cassia was poisonous when retained in contact with animal tissue. I have seen these blisters time and again, and have often warned dentists not to use it in the pulp chambers of teeth, and yet they have persisted in using it. The lesson to learn from this is that we should choose our antiseptics, not with relation to their power as a poison to microbes entirely, but should have especial reference to their action upon the animal

tissue to which they are applied. Arsenic might be said to be an antiseptic. Why is it not used? Because it is more poisonous to the animal cell than to the vegetable cell. What we want, if we want simply and purely an antiseptic, is an agent that is poisonous to the vegetable and not to the animal cell. Now in cassia we have one of the most powerful poisons to the vegetable cell, but we have also a poison to the animal cell, and should have a care how we use cassia. Then the wonderful agent formalin, the new antiseptic, the great antiseptic; we find it is certainly as poisonous to the animal as it is to the vegetable cell, hence, of no account as an antiseptic in connection with animal tissue. It will do to destroy germs in cloth, clothing, and such substances, but is utterly unfit to use as an antiseptic upon the animal tissue.

Now, if this paper will induce men to think along these lines and choose their agents along the lines dictated by the experiments produced, Prof. Peck will be repaid for the loss of time and the physical suffering he has endured, and the tissue he has lost in the making of these experiments, for I know personally that it has been a sore piece of work, and I believe the terrific sore made by formalin is not yet healed.

Now, that is about all I have to say, gentlemen. Take the paper home and read it carefully and learn this lesson, that you should use your antiseptics not only as antiseptics—that is only one part the drug plays—but use them also with reference to their therapeutic properties. If you need an anæsthetic agent to allay pain you may be justified in using carbolic acid, possibly, but in most instances you will do better to use oil of cloves. If you want, at the same time, a stimulant, you will use one of the stimulating agents, one that has the power of irritating a little and stimulating tissue; reduce oil of cassia and use that, or reduce oil of cinnamon and use that, or several others along the line, and so on throughout the piece. You may use a sedative and at the same time an antiseptic, or a stimulant and at the same time an antiseptic. You see the wonderful power we derive from these agents. Do not continue to use as antiseptics substances that are not proven to be antiseptics. Take bichloride of mercury, the great antiseptic; it is utterly useless in fighting pus formation, because of the albumen present destroying the power of the agent, as is shown in the treatment of the sores by Dr. Peck, and has been shown over and over again. To fight pus formation it is utterly

useless; to disinfect the skin, an excellent agent. We need to learn to use these agents in the right place. Also carbolic acid is almost entirely useless in fighting pus formation because of the same difficulty. It coagulates albumen and the effect of the carbolic acid is destroyed. It is only transient, at any rate, in its use as an antiseptic. Whereas we have in the old, worn-out creosote still one of our best agents, and I remember well how we used to try to get the carbolic acid instead of creosote that the dealer would poke off on us, rejecting the better agent because we knew no better. I hope that hereafter not one of you will use an antiseptic without asking the question—What is the effect of this drug upon the animal tissue to which I apply it? Suppose you know that it will destroy bacteria; what is its effect upon the animal tissue; is it desirable?

Now another little point which I must speak of is this: Suppose you open an alveolar abscess; we know how quickly the tissues will heal and will cover in the abscess again, in very many instances, and prevent a free, full discharge. A little bit of cotton moistened with carbolic acid and placed in that cut will keep it open, that will perfectly prevent the healing. Now, suppose you make a little mistake in your choice there and use "1-2-3" in the same way, what will be the result? The granulations will grow right in through and through that cotton, and when you take it out, instead of having a ropy, pusy wisp of cotton, you will have your cotton filled with blood and tissue; the one stimulating the growth of the tissue, the other destroying it. It is greatly to be regretted that oil of cassia is being so greatly adulterated, and probably, from what I can learn of it, by the men who make it in the field. It is greatly to be regretted. I noticed it first three years ago. I found specimens of the oil of cassia that were adulterated with fixed oils and I had to make trial to get the pure oil; but to-day we cannot find in Chicago, nor from the dealers to whom we have sent in other cities, a pure oil of cassia. Since its introduction as an antiseptic, ten or eleven years ago, the demand for the oil has been so much greater than the supply that the price has run up, and the adulteration has been resorted to to increase the amount and keep the price down, until to-day it is impossible to get a pure article. My son, who is practicing surgery largely and using the oil, buying it fifty pounds at a time, finds it now impossible any longer to get a pure article, and when I was home last he showed me his oil of

cassia and complained of it; he would take a solution of it and wash his hands and it would leave his hands greasy and sticky. It is wretched that so valuable an agent should be adulterated in this way.

I think I have talked long enough, Mr. President. I only wanted to call attention especially to the class of work done, and especially to this testing of the poisonous properties of antiseptics upon the animal tissue as well as on the vegetable tissue, or microörganisms. The one is just as important for us to consider as the other. See that we do not use irritating agents where we need sedative agents, and that we may use stimulating agents where we need them and may use sedative agents where we need them.

Dr. C. P. Pruyn, of Chicago: Along the line of formalin, it may not be known to many that this agent is a wonderful perservative agent. I know of a certain undertaker in Chicago who has used it for embalming purposes with wonderful effects. He had in his basement the body of a young woman injected with formalin. He had kept it for two years laid out on a board, and at the end of that time the body was just as beautifully preserved as it was the day after death, and when a candle was held under the outstretched hand there was an opacity where the bones were, and a beautiful clear translucency through the soft tissue. I saw another case of a young woman that he had preserved for a year. He had her dressed and standing erect and she looked so natural that I almost thought she was alive. He had another case of a body that he had embalmed in the same way for six months, and the body was beautifully preserved.

Dr. E. Lawley York, of Chicago: I have listened to the paper with pleasure, and I am afraid with a little envy. It is a magnificent paper. Having done some experimental work myself I know the amount of time, energy and money a man has to put in to produce the results that Dr. Peck has. At the same time I take issue with him in a few things. I may be wrong, if so, I want him to put me right. He states that he diluted the drop of oil with alcohol. I would like him to tell me whether it was ninety-three per cent, ninety-five per cent or absolute alcohol. He also stated that he took ten drops of the alcohol and one drop of oil; that would make eleven drops. Would one drop of that be one-tenth or one-eleventh of a drop? His figures are very exact

and they will go out and be published and some fellow might figure it out and prove that they were not accurate. The alcohol I believe is an antiseptic in about one to ten itself; therefore, it has something to do with the restraining power, and might alter the figures somewhat. I would like to ask Dr. Peck if he could not use something like carbolene. I have experimented with it but slightly and would not say for certain whether it has any antiseptic properties or not, but I believe that we would get absolute results if we use something of that kind. I would like to ask him why he infected his tubes with saliva. A number of these experiments had to be carried out which extended over so many days; he would not get the same organisms every time, even though he took it from the same man's mouth, because the very fact of drinking a glass of beer will alter the character of the secretions in his mouth materially. I would like to ask him for information, whether if he had taken a known organism and used that all the way through, whether it would not have been just as well; he would have known then with every oil or drug that he used he had precisely the same conditions to deal with. Now, for instance, saphrophites are a little more difficult to destroy than parasites, and the micrococci than the bacilli. Now, in the mouth you do not know what you get; you may get them all or you may get one or two or ten or twelve of them. Now, had he employed a spore producing organism, say the anthrax, it would have been better. I think he would find the vegetating organisms are much more easily destroyed than the spores. In the mouth he would not find spores. An organism only takes on the spore stage when it has exhausted the medium in which it is growing. It is never going to exhaust it in the mouth.

I do not think I have any further questions to ask.

Dr. Black: I would like to say just one word in regard to the source of infection, and it is a very important point, as I regard it and a reason why we have a considerable number of disinfectants forced upon us through error. It is entirely unsafe to use a microorganism from cultures for testing antiseptics, because of the weakening effect of the artificial cultivation. If we are to test antiseptics we must take microörganisms from their natural habitat, from the original source where they grow in all their glory, and not take microörganisms that we have weakened by cultivation. By taking microörganisms from the saliva, we as dentists have the best

possible source of obtaining them in their full vigor, and to get them in that variety in which we are most likely to find them in fighting microörganisms.

Dr. C. N. Johnson: Would not it be better if we could get them from the pulp canals of the teeth instead of from the saliva?

Dr. Black: We will get the same microörganisms from the saliva that we would if we took them from the pulp canals, and we get a variety in almost every instance.

Dr. Peck: In regard to the alcohol used, it was commercial alcohol, ninety-five per cent, and of this alcohol, which was carried to its limit as an antiseptic, eighty drops are required to prevent development of bacteria in ten c. c. of broth, hence the small quantity used in the division of a drop of an essential oil can have no appreciable influence in connection with the antiseptic action of the latter. This is the method used in times past by such men as Pasteur, Miller and Black, and it is a safe proposition that had there been a better method they would have discovered it.

In regard to the *ten* drops of alcohol and *one* drop of oil. This has been said just as I intended it should be. And one drop of this solution represents one-tenth of a drop of the oil as nearly as it can be represented from the standpoint of a scientific mathematical problem.

When using the same dropper it will be observed that a drop of alcohol is slightly smaller in bulk than a drop of an essential oil, and because of this difference in the size of the drops, *ten* drops of alcohol and *one* drop of an oil forms as nearly as it can be figured a ten per cent solution, hence one drop of this solution represents *one-tenth* of the drop of oil. Also the dissemination of the drop of oil throughout the ten drops of alcohol renders the solution slightly thicker than the alcohol itself, so only ten solid drops can be dropped from the solution instead of eleven, as one would naturally suppose.

Dr. Black has anticipated me in what I was about to say regarding the use of saliva for infecting the broth. It is a well-known fact among scientific men of experience that bacteria produced by continued cultivation become greatly attenuated after a few generations. Their virulent nature is larely diminished. They would be destroyed or their development prevented by less potent agents than when experimented with while in the full vigor of their existence. Also germs that require the most potent

germicides to effect their destruction are prevented from developing nearly as easily as are those germs that are destroyed by the less potent germicides. Such a method as the one suggested, in my judgment, would be unscientific, to say nothing of its inaccuracy. As we find in the saliva all classes of germs with which we have to deal in the treatment of diseased conditions about the mouth and teeth, I used this method as the accurate, scientific one. You will not lose sight of the statement that a control tube was used in connection with each set of plants—a tube the broth of which was infected but into which no antiseptic was placed. It was impossible to note any difference in the amount of development of bacteria in these control tubes—which fact alone is sufficient to satisfy me that the conditions, after the broth was infected, were as nearly uniform as could be.

One other point to which I wish especially to direct the questioner's attention, that the results of this work are not presented to represent the germicidal power of these agents, only their *antiseptic* power, which means their ability to retard, restrain, prevent the development of germs—not to destroy them. Hence all this talk about the destruction, annihilation of germs has no place in this discussion.

Dr. Garrett Newkirk, of Chicago: I cannot let this matter pass without saying that I think we all appreciate very much the amount of labor and the careful work of experimentation and the self-sacrifice that Dr. Peck has undergone in the preparation of this paper. Why it is quite soldierly, to my mind, the amount of suffering that he has been willing to undergo to give us the results of these experiments. It seems to me he might go to Cuba with the soldiers, and be considered an "immune."

I was particularly gratified to find that my good old friend, oil of cloves, was supported and endorsed, and that the experiments bore out what I have been led to believe by the chemical experience of many years. It simply establishes my confidence in the oil of cloves. A few such drugs as this are about all we need in ordinary practice. I heard an old physician say once that he could practice medicine successfully with three or four drugs; he wanted ipecac, calomel, quinine and one or two others. We can almost practice dentistry, it seems to me, with the oil of cloves, arsenic and cocain.

Dr. Peck (closing discussion): I will occupy just a few minutes.

The first point is regarding the meaning of these expressions—antiseptics, disinfectants and germicides. So many of us use these terms interchangeably, as if each one means just exactly what the other one means, which is entirely wrong. The two terms, antiseptic and disinfectant, were used by the medical profession years before any knowledge was had regarding pathogenic microörganisms and their influence in the production of disease. The term antiseptics, as used at that time, simply meant those agents which prevented or restrained or inhibited the growth or development of pathogenic microörganisms, not agents which actually destroyed or killed the germs. The word disinfectant was used to give expression to those agents which prevented further decomposition of septic matter and the formation of gases, mephitic odors, etc., also to destroy the latter, but not necessarily agents which destroyed the life of the germs. After knowledge was had regarding pathogenic microörganisms and their influence in producing diseases, the expression, germicide, was coined, and used to give expression to those agents which actually destroyed the life and potency of the germs themselves.

As I said last night, this experimental work which I have done is simply for the purpose of presenting to you the antiseptic properties of these agents, nothing more. The experiments which have been conducted with the spray of these various oils on pathogenic microörganisms, pus, etc., on animal tissue, do prove quite conclusively that many of them are also germicides as well as antiseptics; but there is other expermimental work that will be done (the result of which, possibly, I may have the pleasure of presenting to you some time in the future) to determine exactly which ones of these agents are germicides and their relative value as such.

I thank you very much indeed for the manner in which you received the paper. The continued hand clapping at the close of its reading meant a great deal more to me than anything that any of you might have said regarding the work. I thank you very much.

REPORT OF THE COMMITTEE ON DENTAL SCIENCE AND LITERATURE.

By A. W. Harlan, M. D., D. D. S., Chairman, Chicago, Ill.

In pursuance of time honored custom, this report is made to epitomize some of the things that have been brought out during the year.

Among the new books of note we find a new edition of Tomes' Dental Surgery, edited by C. S. Tomes. From a somewhat careful reading we find it to be more complete than any previous edition, and can recommend it as a safe guide to students and practitioners.

A new edition of Richardson's Mechanical Dentistry by Warren (G. W.) is likewise a good laboratory guide, practical, and having no useless padding as many revised editions are likely to have.

Ambler (H. L.) has published a practical treatise on Tinfoil which is very complete, and we hope it will be read by many who are now filling too many teeth with cements and amalgams of indifferent composition. (Copper amalgam seems to have dropped out of sight lately.)

E. W. Roughton has brought out a work on Dental Surgery which has been running as a serial in the *British Journal of Dental Science*. This is a compact work, and we think it will prove of service in minor surgery.

H. S. Nash has published two volumes on Pyorrhœa Alveolaris, but from the criticisms so far published, we are not able to say just how valuable this work may be. It is understood that a revised edition will be out soon to be brought up to date. (Better wait until that is out before you buy.)

The three best books of the year are Marshall's Diseases of the Face, Jaws and Associate Parts, by John S. Marshall, M. D., of Chicago, and Black's Dental Anatomy, fourth edition, by G. V. Black, M. D., D. D. S., Chicago. The arrangement of these

works makes it a pleasure to read them. While we may not agree with everything to be found inside the covers of these works, we take pleasure in recommending them to students and surgeons for faithful perusal.

The American Text-book of Operative Dentistry, edited by E. C. Kirk, D. D. S., is the third of the list which we consider ought to be in every library.

Personally we prefer a single author's book, but the next best is associate work of specialists. Many of the chapters of this book are exceedingly good essays and sometimes they overlap each other. The work is more useful for the practitioner than the student, but even here we may err in our estimate of it. The practice is mostly sound and orthodox, and you will not miss it if you buy it.

Morton's work on Cataphoresis will likely commend itself to practitioners who must get some knowledge on this subject, but it is a padded work of large type, on thick paper, and the price is out of all reason for the subject matter. If it had been made a $2.00 book it would have had a large circulation. Its merits are obvious, but most everything in it has already appeared in journals. A second edition will probably come out, or some other author will publish a new book which you can afford to wait for.

Farrar has volume II. out on Irregularities, but we have not seen it.

Vulcanite Work, by Henry Rose, is a good English monograph.

Books on various subjects in French and German have been published, but as most of the audience do not read French or German, these works are omitted from consideration.

JOURNALS.

Several new candidates have appeared, the most notable being *The American Dental Weekly*, edited by B. H. Catching, D. D. S., Atlanta, Georgia. (Catching's Compendium is no more.) This is a well gotten up, carefully edited paper and deserves to succeed. The price is $2 a year. There is a good list of collaborators, and we wish it success.

The *Indiana Dental Journal*, published at Indianapolis, is a monthly, price $2. Dr. Geo. E. Hunt is the editor, and he is making a very readable journal.

If the profession would only read books, not skim them, much better work would be done everywhere by editors and be more satisfactory to subscribers.

The Dental Brief is a new name for *Welch's Monthly*. It is what its name implies, with a fondness for peculiar spelling and peculiar missionary editorials. It certainly does no harm and may do some good by giving wider circulation to "funnigraphs" and some solid matter.

The Dental Century is a new journal published in Madison, Wisconsin.

A few journals have died, and one or two others have changed names; but all the others are thriving.

SCIENCE.

What is science? In making a report of this character, we are not quite sure whether progress means science or not. It seems that instrument nomenclature would be thought science, but we think not. It is more literature than science.

The composition of alloys and the making of amalgam fillings is partly science and partly mechanics. At any rate, progress is to be noted in this line. It seems more than likely that after five or ten years more we will be able to observe that real progress has been made in the matter of making alloys and amalgam fillings. At present we are on the fence looking at the work. We do not believe that perfection has been reached by any experiments. We are waiting for the returns. Much good work has been done but not enough to settle the question.

The microscopists and bacteriologists have had it all their own way for the past few years, so we cannot report anything new in technique or in results.

Dr. M. H. Cryer has covered himself with glory in some new dissections of the cranium which he exhibited at home before the American Medical Association. These were published in the association journal recently. The writer has searched for some epoch making discovery in pure science, but the only ones which can be reported are the liquefaction of air and the condensation of formaldehyde into a solid.

A few of the subjects which have received most of the attention of the profession during the past year, are the following:

The revival of the study of using tin and gold in combination, and the tendency to return to a more extended use of gold foil in its soft state, will result in the making of many better fillings. The scientific investigation of the behavior of amalgam fillings will

tend to yield good results, for it will not be long before those who give the matter the closest attention will freely admit that amalgam is at best a very poor filling material, and while in some cases it is indispensable, these cases are rare and far between; and if therefore the day when this truth is to be proclaimed is drawing nearer, we cordially approve of the energy displayed in investigation. Cataphoric appliances have been considerably improved, and many of the obscure phenomena are coming to be understood, thus enabling the operator to use this process with more intelligence.

In closing, we would suggest that when you go home be sure and read two or three good novels and a few biographies and some books of travel and a little of Herbert Spencer with a few other miscellaneous works, and your summer will be well spent. That is what we are going to do for recreation from the hard work of daily practice.

DISCUSSION.

Dr J. W. Cormany, of Mt. Carroll: Opening discussion. I just want to call the attention of the society to what we used to have at every meeting. It was Keener, I think, would bring all the latest works on dentistry and every one of us had an opportunity to see these new works, and I have no doubt that he made a good many sales. I have felt very sorry for the past few years that this has not been done, and I would suggest to the committee on dental science and literature that they collect together these new works and have them here so that we can all see what they are. We read about them, read the criticisms and we are undecided whether we want them or not, but if we can see the books it is quite an advantage, especially to those who do not live in the city.

REPORT OF COMMITTEE ON ART AND INVENTION.

By J. E. Keefe, D. D. S., Chicago, Ill.

Since our last meeting eighty-five patents have been issued on instruments and appliances pertaining to dentistry.

Of this number but few can boast of being entirely new and original, the greater number being improvements on old devices.

Your committee respectfully submits the following appliances for your consideration:

1. Dr. Fourt's Articulator, manufactured by the Marshall Dental Manufacturing Company, Des Moines, Iowa.—The particular advantages claimed for this articulator are its lateral and incising motions. The ball and socket joint is absolutely tight, as the balls corresponding to the condyles of the human jaw, are held against the walls of their sockets by the tension of concealedsprings.

It has two flat surfaces allowing it to rest equally well on either; a great convenience, obviating the necessity of taking apart, and preventing tipping. It opens at a right angle, facilitating the setting up of cases and lessening the danger of dropping one plate while working on the other, in full cases.

The upper jaw piece is adjustable longitudinally, but sets in a slot, rendering it rigid and avoiding possibility of lateral displacement, and is gauged so that it can be changed with accuracy.

2. Dr. R. C. Brophy, of Chicago: Dental Laboratory Gas System.—It is designed particularly for practitioners who have not ordinary coal gas to use. By its use, equally as well as with coal gas, can vulcanizing, melting metals, heating water, acids, waxing up, soldering, porcelain work, casting aluminum, refining gold, etc., be done. A gallon of gasoline will run the generator one day at full blast, so the expense is merely nominal.

Dr. Brophy will demonstrate this apparatus at the clinic.

3. Dr. B. J. Cigrand, of Chicago: System for producing an interdental band.—This consists of two trephines of sizes usually desired for banding the interior ten teeth, and a gauge-

mandrel which has two stumps which are the exact complement of the trephines. If it is intended to band a root of the size of the large trephine, the gauge-mandrel indicates on its side nearest the large stump the exact size of the gold necessary to fit the selected trephine.

The trephine is so constructed that the face of it is slightly larger than its body; this allows the instrument to cut without pinching. It has two large slots in its circumference, and this admits of the steel yielding in the event of uncertain leverage, and the teeth of the trephines are modeled after those of the log circular saw, and the small grooves leading from the teeth permit the sawed dust to escape without clogging the instrument. It requires but a few revolutions of the trephine to effect a perfect intradental groove. The band is usually made of gold, but may be of iridio-platinum. In setting a Logan crown by this method the band is cemented into the groove independent of the crown and the crown is attached by means of cement on the post with a disk of gutta-percha or chlora vulcanite at the joint end. The Richmond crown can also be constructed with intradental band and mounted the same as the Logan.

4. Dr. J. W. Hard's, South Tacoma, Wash., Universal Forceps, wherein the gripping device will automatically adjust itself to all parts of the tooth to be extracted.

5. Dr. Kirkwood's Annealing and Sterilizing Combination.—This combination is a compact, convenient apparatus to be screwed to the corner of an operating table. It consists of a Bunsen burner, cotton tank, cotton waste catch, curved support for hot air syringe, tray for annealing gold, sponge holder, water tank, tube for annealing alloy, tray for annealing gutta-percha, and curved support for instruments.

Dr. Kirkwood will demonstrate this apparatus at the clinic.

6. Dr. Spooner's Dropper.—This dropper is made of glass, having a sharp end which can be screwed into a cork. As the dropper enters the fluid the same rises to its level. On taking it out of the liquid and holding horizontally no flow takes place. Thus it will not leak over the table in transferring from bottle.

7. Spooner's Cement Mixing Tab.—This tab contains about one hundred parchment leaves, to be used in place of glass for mixing cements. The advantage claimed for this is, that it does away with the necessity of washing glass slabs after mixing cement. In the tab, a leaf is removed after each mixing.

8. Dr. R. A. Dunlap's, Carrollton, Ohio, Safety Impression Cup.—The object of this cup is to prevent the plaster from falling into a patient's throat when taking an impression for a full upper denture. It consists of a safety cup attached by a spring to the end of an ordinary impression cup fitting automatically to any mouth.

9. Clamp and Press, by Dr. O. L. Bandy, LaSalle, Ill.—With this device a dentist is enabled to swedge any kind of metal in making plates. It has a combination hammer which can be used while the clamp holds the dies in place. There are many other features of this clamp which will be demonstrated at the clinic room.

10. By Frink and Young, Chicago: A New Hand Piece, Universal and Simple.—The locking device is a spiral eccentric and clutch. This will be exhibited at the clinic.

11. The Gould Fountain Spittoon, by J. P. Von Lackum & Co., Chicago.—A spittoon constructed with double bowl and having two revolving arms to distribute water. Flushes bowl from upper edge and water passes directly downward instead of having rotary motion.

12. Dr. Spooner's Quick Filling Syringe.—This syringe is designed to save time. It is so constructed that water can be quickly drawn into the syringe and be evacuated in a fine stream.

13. Rubber Dam Spreader, by Dr. S. E. Knowles, San Francisco, Cal.—The claim made for this spreader is, that it is easily adjusted, and when adjusted will hold the rubber so that there will be no loose ends in the way of the operator.

14. A Method of Making Dies Without Sand, by Dr. J. P. Palmer, Chicago.—Prepare the mold in the usual way and give one coat of shellac, oil the surface, wipe off all excess. Then mix equal parts of fiber asbestos and plaster, take impression of model as high as plaster is intended to go, remove the model from the impression before the plaster is very hard, and dry out over a gas burner for one and one-half hours, then pour the metal into hot mold.

15. From Dr. L. G. Noel we have some samples of medicated thorns from the prickly pear tree, which he uses for the filling of root canals in the anterior teeth and the lower bicuspids.

16. The Black Diamond Wheel Co., of Chicago, has sent some samples of their black diamond wheels, which they

guarantee to wear even and true, and not susceptible to heat or moisture. Any one wishing to try these wheels may do so at the clinic.

17. A Hand Piece, by the Dental Protective Association.—This hand piece can be set in three different positions by a simple sliding bar, and is held rigid at right angle, half right angle and obtuse angle.

18. Deflectejector, by Dr. J. E. Nyman, Chicago.—This instrument is designed for attachment in place of ordinary saliva tube. It depresses and deflects the tongue and provides an exit for the saliva. It can be held by the patient during an operation.

19. A New and Simple Pattern of the Berry Electric Dental Engine, resembling the old style foot machine in appearance, doing away with the belts, brackets and ceiling attachments. Was exhibited by Dr. Thomas, of Chicago, with the Berry Electric Silent Lathe.

20. W. V-B. Ames, of Chicago, has recently devised an apparatus for utilizing nitrous oxide or oxygen gas for blowpipe purposes, which overcomes the irregular pressure which is so objectionable when the gas is taken directly from the cylinders.

The apparatus consists essentially, in addition to a good oxy-hydrogen blowpipe, of two rubber air pillows twelve by eighteen inches, confined between rigid surfaces—two boards for instance—about four inches apart.

One of these bags is connected with the gas cylinder and the blowpipe by a three way pipe, and the other connected by another three way pipe to a source of air pressure and an automatic pressure regulator. After filling the gas bag air is forced into the other bag, the pressure of which will force the gas through the blowpipe at a rate which can be regulated at will, by the automatic pressure regulator which can be set to allow the surplus air to escape.

This arrangement admits of a pressure of one pound to the inch from a foot bellows or other source of air pressure, creating over two hundred pounds pressure upon the gas bag, i. e., a pressure equal to a weight of over two hundred pounds placed upon the upper board without any air pressure in the air bag.

Dr. G. V. Black has designed and had made by the S. S. White Manufacturing Co. six additional forms of Perry Separators. They are designed to overcome certain difficulties met with in the use of the Perry separator as heretofore found in the

market. In the regular set of Perry Separators there is but one size and form for the molars, one for the molar-bicuspid and one for the bicuspid.

Two additional forms have been devised for each of these positions. They are called specials. They are made to catch the tooth nearer the gum margin than those of the regular set, so that they can be used on very long teeth, or upon teeth very much broken down. The other forms designed have extra broad bows, so they can fit over teeth that are extra large or irregular.

REPORT OF THE SUPERVISOR OF CLINICS.

By E. K. Blair, D. D. S., Waverly, Ill.

BY DR. C. P. PRUYN, CHICAGO.

Clinic No. 1. Patient, Dr. W. A. Johnston, Peoria, Illinois. Applied the dam to the L. L. second and third molars, using one hole in the dam for both teeth, driving an orange wood wedge between the teeth. The result was good separation and thorough dryness. A disto-occlusal cavity in the second molar and a mesio-occusal cavity were beautifully prepared and thoroughly filled with Fellowship alloy. These fillings bore a good polish, and will be of interest to the society one year hence.

BY DR. G. W. SCHWARTZ, CHICAGO.

No. 2. Patient, Dr. G. A. Miller, Chicago. Porcelain crown. Tooth, right lower first molar. Carved and baked from Close's body, no facing being used. The reason for not using facing is that a better anatomical reproduction can be made by modeling from body entirely. The advantages are:

1. The ability to properly contour for both contacts, mesially and distally, and proper occlusion as well.

2. The absolute cleanliness and natural appearance.

3. The ability to properly prepare root and restoration of interproximate space.

This was a very perfect piece of work.

BY DR. LEVITT E. CUSTER, DAYTON, OHIO.

No. 3. Successfully demonstrated new process of fusing platinum, using Edison 110-volt current, a process quite valuable as an adjunct to our present laboratory methods. All scrap platinum is readily utilized by this method.

BY DR. JAMES W. CORMANY, MT. CARROLL.

No. 4. Patient, Dr. Moorehead, Aledo. Gold filling. Cavity, mesio-occlusal right upper first bicuspid. The seat of the cavity

might have been a little more square and all fissures cut out complete. The manipulation in making the filling was excellent and the finish good.

BY. DR. R. N. LAWRENCE, LINCOLN.

No. 5. Gave a clinic on making and tempering instruments, making various forms of chisels, excavators and pyorrhœa instruments, giving in detail instructions in the successful working of steel.

BY DR. CALVIN S. CASE, CHICAGO.

No. 6. Exhibited new methods and appliances for regulating and retaining the teeth, all of which are entirely new and original. Dr. Case's paper read before the society gives a very clear idea of the uses of these valuable appliances.

BY DR. C. B. POWELL, JACKSONVILLE.

No. 7. Patient, Mr. McCogan, Chicago. Gold filling, disto-occlusal cavity. First superior bicuspid. Separation was made with Perry separators. The preparation of the cavity was thorough; filling made of Kearsing's pellets; pneumatic mallet used; good contact point made; good finish and excellent result.

BY DR. A. J. M'DONALD, KANSAS CITY, MO.

No. 8. Engine exhibit. The peculiarities and benefits claimed by the inventor of this engine are, the combination for all operating attachments, viz., right angle, without the necessity of slip joint combination—foot power, water power and electricity, with a mechanism for shutting off, turning on at will any power used in the engine itself; also, pneumatic mallet attachment. This was an interesting clinic.

BY DR. J. H. KENNERLY, ST. LOUIS, MO.

No. 9. Removal of plug, cataphoresis. Present. No patient found, though a strenuous effort was made by both supervisor and local committee.

BY DR. G. A. BOWMAN, ST. LOUIS.

No. 10. Absent and excused.

BY DR. M. R. WINDHORST, ST. LOUIS, MO.

No. 11. Solilda gold filling. Patient, Dr. W. F. Lawrence, St. Louis, occlusal cavity left lower third molar. The use of this gold

is inclined to lead to hurried operations with untoward results. The preparation of cavity would have been better had more of the distal wall been removed. The manipulation of the gold was good and finished satisfactorily.

BY DR. A. W. M'CANDLESS, CHICAGO.

No. 12. Demonstrated by models the preparation of roots for porcelain crowns, showing the use of carborundum wheels and Starr root instruments. This work was excellent.

BY DR. R. C. BROPHY, CHICAGO, ILL.

No. 13. Demonstrated a method of casting aluminum. A full upper denture was cast, using the WhitleyDental Furnace and laboratory gas system. The plate was cast by a new method, neither pneumatic pressure nor suction being employed. By this method either full or partial plates with teeth attached may be cast with assurance of good results.

The Whitley Dental Furnace and laboratory gas system used in this work may be employed for porcelain work, fusing metals, refining gold, vulcanizing, etc. A blowpipe is attached with which all kinds of soldering can be done successfully in any office, as gasoline is used. This was a very excellent clinic.

BY DR. THOS. L. GILMER, CHICAGO.

No. 14. Will give surgical clinic if suitable case can be procured. Present. Only one patient available, and that for implantation, and for this case there could be procured no tooth desirable.

BY DR. A. W. HARLAN, CHICAGO.

No. 15. Pyorrhœa. Absent. Satisfactory excuse given.

BY DR. GEORGE A. THOMAS, CHICAGO.

No. 16. Platinum band fitted on left superior lateral incisor, using pure gold for solder. A platinum pin was attached to the cap, allowing the pin to extend downward an eighth of an inch. A plate tooth was then selected and ground to fit into position. The pins of tooth were then pressed around the pin of cap closely to hold while putting on porcelain preparatory to baking, after which the crown was baked in Custer's furnace. Under favorable conditions this work can be performed in forty minutes. The result was a very substantial and artistic piece of work.

BY DR. L. W. SKIDMORE, MOLINE, ILL.

No. 17. Dr. Skidmore's method of preserving what natural teeth a patient may have, to serve as a guide, in setting up artificial teeth, was clearly demonstrated by use of models, etc. This procedure will often serve a good purpose both in aiding the operator in reproducing natural facial expressions and showing the patient at later sittings the exact position occupied by the natural teeth prior to extraction.

BY DR. JOHN G. HARPER, ST. LOUIS, MO.

No. 18. Modeling composition. Counterdies. Absent.

BY DR. W. H. TAGGART, CHICAGO.

No. 20. Carving porcelain. Absent.

BY DR. J. W. WASSALL, CHICAGO.

No. 21. Bridge attachments to teeth with living pulps. Dr. Wassall's method is as follows:

The bicuspid, cuspid, lateral or central, is prepared with double compound cavities having parallel and perpendicular walls; a flat base and no undercuts. Sufficient of the lingual cusp of the bicuspid and the nodules of the anterior teeth is removed to allow the gold covering to intervene in occlusion. Mesial and distal surfaces are ground as nearly perpendicular as is consistent with good looks and a perfect impression.

Impressions in gutta-percha are obtained and dies made of Mellotte's metal. On this die 120 rolled gold foil is burnished over the lingual proximal or cutting edge as the case demands. The edges proximally extend no further buccally or labially than can be thoroughly cleansed by brushing. When adaptation is perfect the foil is waxed, removed and invested in plaster and silex. Thirty gauge clasp metal is sweated bit by bit until the whole surface of the foil is covered. Where the edges do not perfectly unite twenty carat solder may be used to advantage.

Bridges constructed in this manner are assembled in usual way. For this method it is claimed great strength, perfect adaptation, cleanliness and the exhibition of but little gold. Much skill was manifested in the entire work.

BY DR. J. E. NYMAN, OF CHICAGO.

No. 22. Patient, negro, name unknown. After the removal of the pulp of a right superior lateral by Dr. Windhorst, of St. Louis, Dr. Nyman removed the enamel, trimmed the root for a band and enlarged the root canal for a post. Subsequently Dr. Thomas made and mounted a porcelain crown as shown in clinic No. 16. Suitable cases for porcelain crown work were hard to obtain and the work in this case was divided with happy results.

BY DR. GEO. M'MILLAN, ALTON.

No. 23. Bleaching. Patient, Mr. Thos. Hayes, Springfield. Teeth bleached, left upper central and lateral. The dam was applied, cavities thoroughly excavated, root canals filled with gutta-percha and about one-third of the root canal fillings removed and twenty-five per cent sol. pyrozone applied and dried out with hot air. This was repeated until a very perfect result was obtained. The enamel surfaces of the tooth were bathed with the twenty-five per cent solution repeatedly. Cavities filled with Dr. Ames' cement.

BY DR. GEORGE D. SITHERWOOD, BLOOMINGTON, ILL.

No. 24. A practical case in orthodontia, using the Angle method. Patient, Ralph Shickle, Bloomington, Ill., twelve years old. Had been under treatment ten months; most promising results. Patient was wearing stay plates pending the eruption of superior cuspids. Good progress and very instructive clinic.

BY DR. C. B. SAWYER, JACKSONVILLE, ILL.

No. 25. Demonstrated by models method of making gold crown and producing occlusion, as follows: After preparing the root two measurements are taken, wire with dentimeter and thin strip of copper. The wire loop is placed on the end of a piece of hard wood, after which strike it with hammer. Then trim the wood to mark and shape the band on the wood. Place the band on the root, fill with soft modeling compound, obtain bite of antagonizing teeth. The band is then removed, and cusps carved up in the impression material; then make an impression of crown in moldine and make a die of fusible metal.

Dr. Sawyer usually swages the cap on the end of the block of pine instead of making a metallic counterdie. Cusps are always reinforced, using small bits of plate scrap cut very fine.

Much care was given to produce perfect occlusion and to preserve the interproximate spaces by properly contouring the crown. This was an excellent clinic.

BY DR. H. J. GOSLEE, CHICAGO.

No. 26. Exhibited extensively prepared models carved in plaster, preserving in a remarkable degree the occlusion of opposing teeth.

All crowns and crown cusps were shown in gold, producing a most interesting and instructive clinic.

The completeness of the clinic enabled the doctor to show the various steps and the accuracy resulting therefrom in the construction of crowns and bridges. His methods were as follows:

After the band is fitted a bite is taken, followed by an impression. The model is procured, the bite adjusted to same and placed upon an articulator.

After separating, the surfaces of the occluding teeth are varnished; the band is then filled with soft plaster and articulator closed.

After hardening, this plaster outline is trimmed into form of typical tooth, without interfering to any extent with the various points of occlusion.

The imprint of the cusps is then procured in moldine and die and counterdie run. Either a swaged or solid cusp can be used.

In bridge work the same procedure applies. The abutments are made first and models with same in position are placed upon articulator. The facings for articulating "dummies" are selected, ground and backed, one pin of each being allowed to remain projecting in a crooked position. The facings are then held in position on model from buccal side, leaving backings exposed, against which soft plaster is now poured to receive imprint of occluding teeth. This plaster is held firmly in contact with facings owing to pins being left as described and is trimmed into desired forms of teeth represented. Dies are secured and cusps reproduced in metal (gold) with this desirable prerogative. They can be swaged separately or collectively (two, three or four in one piece). The time consumed is but little greater than required in the selection of suitable cusps from any other system, and the results more accurate.

BY DR. H. I. POTTS, BLOOMINGTON.

No. 27. Patient, office boy of Dr. Grafton Munroe. Tooth, left upper central incisor; cavity, mesio-occlusal. (Step cavity.) Gold filling. Rowan's dec. gold rolls and platinum gold folds used. Preparation of cavity good, contour properly restored, result excellent.

BY DR. J. N. CROUSE, CHICAGO.

No. 28. Use of oxychloride of zinc instead of clamps in the application of the rubber dam. Excused from clinic because of his duties with the Dental Protective Association. Lack of time.

BY DR. ELLIOT R. CARPENTER, CHICAGO.

No. 29. Use of cocaine in applying clamps in gingival cavities. No patient found by supervisor of clinics.

BY DR. C. N. JOHNSON, CHICAGO.

No. 30. Preparation of cavities in natural tooth forms. Exhibited a number of typical cavities prepared in ivory tooth forms. This exhibit was most interesting and instructive. Of the many excellent clinics Dr. Johnson has given our society, this is one of the best so far produced.

BY DR. E. MAWHINNEY, CHICAGO.

No. 31. Bleaching. Absent.

BY DR. E. J. PERRY, CHICAGO.

No. 32. Pyorrhœa. Absent.

BY DR. TRUMAN W. BROPHY, CHICAGO.

No. 33. No. 1.—Hypertrophy of the third division of the fifth pair of nerves. Male, aged seventy-five years. The patient had been suffering with facial neuralgia extending over a period of fifty years. During the past fifteen years the paroxysms of pain occurring at frequent intervals on an average of once in every fifteen minutes, or upon the slightest irritation, such as touching the ends of the beard, would at any time bring on a spasm of pain.

The patient's condition was rather feeble, pulse intermittent; his circulation, however, seemed to improve under the influence of the ether, the heart beats becoming quite regular.

The operation consisted in making an external incision over the ramus of the jaw, exposing the bone from the sigmoid notch downward; a strong bur was then employed to remove a portion of

the bone from the sigmoid notch downward, to a point corresponding to the position of the inferior dental foramen, the piece of bone was then removed, nerve exposed, seized by a tenaculum, drawn downward and separated from the ganglia, after which traction was made in the opposite direction and the nerve was removed entire from the inferior dental canal.

The wound was closed, surface dusted with boracic acid, dry gauze applied, and the patient left in charge of Dr. Prince, to whom we express thanks for the courtesy he extended to the society, and Dr. Brophy in placing at their disposal his thoroughly equipped operating room in his sanitarium.

No. 2.—Cyst. Patient, male about thirty-five. The cyst was situated nearly opposite the left second bicuspid, buccally, caused by the irritation set up from a chronic abscess. It was opened, contents evacuated, curetted, irrigated and packed with borated gauze. After treatment to keep thoroughly clean and allowed to granulate from the bottom, keeping lips of wound open.

BY DR. F. H. STAFFORD, CHICAGO, ILL.

No. 34. To reproduce gutta-percha carved cusps in fusible metal, the same to be used as dies for solid gold reproduction. The methods are as follows:

Take great care that the band is fitted properly to the root and cut the correct length, with due allowance for the cusps, and contour to fill the space in an artistic and accurate way. Now take warm gutta-percha, much in excess of the amount to make the cusps, place this in the band and have the patient close the jaws, thereby giving the exact occlusion. When this is done and the gutta-percha well hardened, the teeth are opened, band removed, and the surplus gutta-percha is trimmed off with a warm instrument sufficient to expose the edge of the band, in order to allow for the thickness of the gold used for the cusps and to be enabled after swaging and trimming to evenly approximate its edges with the band, otherwise it would be too large.

To make a solid or cast cusp the same procedure applies, with the exception that in outlining gutta-percha cusps it is permitted to remain continuous and flush with the outside edge of the band; now remove the gutta-percha, fill the band with wax, take impression, place on articulator, remove wax and adjust the gutta-percha. This serves also to prove the bite; now make

imprint in plaster or moldine; if plaster is used wait a few minutes till it hardens, now place an ordinary sandpaper disk on the mold, making sure that the small hole comes over the deepest part of the cusp; now take a small piece of rubber tubing one inch long, having small bore and thick walls, place this on top of the disk seeing that it fits down accurately, allowing none of the fusible metal that you now pour into the tube to escape around the disk. Waiting a few seconds you withdraw the tube, metal and disk, break the disk off and you will have a button or die to make a solid gold cusp. Tightly draw some rubber dam over the cusp, and press same into cuttlefish bone. Now with a nugget of gold into a carbon block, while in a molten state, pour gold into the cuttlefish bone impression and flatten instantly with a case knife, remove, place in acid and you will find an exact reproduction in gold of the carved gutta-percha cusp.

To make one of these cusps with a stem on it, make imprint in plaster or moldine as before stated, but instead of a disk take a piece of vulcanite or plate rubber the size of your mold, in the center cut a hole a little smaller than the button you want to cast, placing the tubing on it, and pour fusible metal into the tube; the sheet rubber will serve to keep the metal from escaping; when cool remove the tube and rubber disk and a cusp with a stem will be accurately made.

BY DR. JOSEPHINE D. PFEIFER, CHICAGO.

No. 35. Frosted aluminum plates by first applying a saturated solution of caustic soda slightly warmed, then nitric acid.

This leaves the surface clear and slightly granular. Plates so treated remain cleaner in the mouth and present a very attractive appearance.

BY DR. R. GOOD, CHICAGO.

No. 36. Pyorrhœa. Patient, Dr. York. Dr. York was so busy assisting Dr. Brophy with surgical case that no time was found for this work.

BY DR. F. B. NOYES, CHICAGO.

No. 37. Amalgam demonstration. The demonstration was so exhaustive and the results have not all been submitted, but the work showed considerable thought and labor; it is of much value to the profession inasmuch as it clearly demonstrates the shrinkage and expansion of amalgams.

BY DR. B. J. CIGRAND, CHICAGO:

No. 38. Demonstrated a method of producing an intradental band. This clinic was excellent. By this process it becomes possible to save teeth that would otherwise be lost. Full description with copious illustrations were exhibited by the operator.

BY DR. O. L. BANDY.

No. 39. Gave an interesting exhibit consisting of a combination clamp and press to be used in both metallic and vulcanite work in laboratory.

BY DR. P. J. KESTER, CHICAGO.

No. 40. Exhibited a new separating varnish consisting of an aqueous solution of shellac. Its advantages were that it flows readily, easily diluted, clean, stains model thoroughly, at the same time obviating the necessity of using oil, thus avoiding bubbles.

BY DR. C. C. CORBETT, EDWARDSVILLE.

No. 41. Exhibited a detachable spring for retaining artificial dentures in place, consisting of a wire extending from a pin about the base of the second bicuspid back to the "heel" of the plate, with a small coil at this point, thence to the "heel" of the opposite plate with another small coil, thence to the pin at the base of the second bicuspid, in said opposite place, making a spring, which, from its shape, does not interfere with mastication or any movement of the jaw. A practical case exhibited.

BY DR. N. D. EDMONDS, CHICAGO.

No. 42. Patient, Dr. E. Lambert, of Springfield, Ill. A continuous gum plate demonstrating the methods of placing a half round wire back of the teeth, soldering the wire pins of teeth together, thus greatly reinforcing the plate on the ridge where the strength is essential. This work was done before the society, from the impression to placing the plate in the mouth.

Dr. Edmonds swaged this aluminum plate without "annealing or battering" by first having the counterdie cover only the palate portion of the die and using a ball of wet paper between counterdie and aluminum plate, striking the die lightly until the plate is drawn down, then using a counterdie covering the whole of the die to turn the rim of the plate, still using a small quantity of wet paper.

The plate was swaged without removing the polish. Good clinic.

The growth of interest in our annual clinics, the diversified fields of labor found in so progressive a profession as ours, and the constantly increasing number of operators capable of giving valuable demonstrations in all branches of our chosen work, combine to produce a difficult task for supervisor of clinics and assistants. We need more space and better facilities than could be procured at this session. Many clinicians were crowded, and more clinics could have been given had space been available. Your committee would suggest not a curtailment of this valuable work, but a renewed effort to meet the demands of the hour. This report in detail, it is hoped, is just, and so written as to help those who failed to attend our meeting.

Respectfully submitted.

E. K. Blair, *Supervisor.*
G. V. Black, } *Assistants.*
E. Lawley York, }

APPENDIX.

LIST OF OFFICERS

. . OF THE . .

ILLINOIS STATE DENTAL SOCIETY,

FROM DATE OF ORGANIZATION.

ORGANIZED AT CHICAGO, JULY 24, 1865.

CHAIRMAN, A. C. VAN SANT, PRINCETON. SECRETARY, E. HONSINGER, CHICAGO.

Ann'l meeting.	Year.	Place.	President.	Vice-President.	Secretary.	Treasurer.	Librarian.
1	1865[1]	Chicago.....1st.	A. C. Van Sant..Princeton.	E. Honsinger ...Chicago.	Edgar Park.....Chicago.	S. Babcock...Springfield.	T. N. Truesdell.....Elgin.
2	1866	Chicago.....2d.	H. N. Lewis.....Quincy.	O. Willson.....Aurora.	G. T. Smith...Princeton.	M. W. Sherwood.Chicago.	L. P. Haskell.....Chicago.
3	1867	Chicago.....3d.	Geo. H. Cushing...Chicago.	A. W. French.Springfield	M. S. Dean.....Chicago.	J. N. Crouse..Mt. Carroll.	W. W. Allport.....Chicago.
4	1868	Springfield.1st.	E. H. Kilbourne....Aurora.	G. P. Kingsley..Freeport.	H. J. Smith.....Quincy.	A.W. French..Springfield	M. S. Dean.....Chicago.
5	1869	Quincy.....1st.	M. S. Dean.....Chicago.	G.V. Black..Jacksonville.	C. S. Smith...Springfield.	A.W. French..Springfield	C. O. Dean..Mount Carroll.
6	1870	Bloomingt'n1st	M. S. Dean[2].....Chicago.	G.V. Black[2].Jacksonville	C. S. Smith[2]..Springfield.	A.W. French[2] Springfield	C. O. Dean[2].Mount Carroll.
7	1871[3]	Peoria.....1st.	G. V. Black ..Jacksonville.	S. C. Wilson .Bloomington	C. S. Smith...Springfield.	G. P. Kingsley..Freeport.	J. M. Hurtt.....Peoria.
8	1872	Chicago....4th.	O. Willson..... ...Aurora	J. N. Crouse.....Chicago.	C. S. Smith...Springfield.	G. P. Kingsley..Freeport.	J. M. Hurtt.....Peoria.
9	1873	Rock Island 1st	J. N. Crouse .....Chicago.	S. L. Edwards ...Peoria.	C. R. E. Koch....Chicago.	S. M. Sturgiss....Quincy.	J. M. Hurtt.....Peoria.
10	1874	Jacksonville 1st	C. Stoddard Smith .Sprl'g'd	E. Honsinger....Chicago.	C. R. E. Koch....Chicago.	S. M. Sturgiss....Quincy.	R. Matthews.....Pontiac.
11	1875	Ottawa .....1st.	G. S. Miles.....Jerseyville.	E. D. Swain.....Chicago.	C. R. E. Koch....Chicago.	C. A. Kitchen.....Galva.	F. W. Dean.....Pekin.
12	1876	Galesburg..1st.	E. D. Swain.....Chicago.	K. B. Davis, Petersburg.	C. R. E. Koch....Chicago.	C. A. Kitchen..Rockford.	O. Willson.....Aurora.
13	1877	Springfield..2d.	K. B. Davis ....Springfield.	E. C. Stone....Galesburg.	E. D. Swain.....Chicago.	C. A. Kitchen..Rockford.	E. B. David.....Aledo.
14	1878	Rockford...1st.	C. R. E. Koch.....Chicago.	S. M. Sturgiss....Quincy.	E. D. Swain.....Chicago.	C. A. Kitchen..Rockford.	E. B. David.....Aledo.
15	1879	Peoria.....2d.	S. M. Sturgiss.....Quincy.	C. A. Kitchen, Rockford.	Edmund Noyes..Chicago.	E. C. Stone....Galesburg.	W. W. Ormsbee....Geneva.
16	1880	Bloomington 2d	C. A. Kitchen....Rockford.	J. Frank Mariner, Ottawa	Edmund Noyes..Chicago.	E. C. Stone....Galesburg.	G. H. Harrington..Delavan.
17	1881	Rock Island 2d	J. Frank Mariner..Ottawa.	J. A. W. Davis, Galesburg	Edmund Noyes..Chicago.	E. C. Stone....Galesburg.	G. H. Harrington..Delavan.
18	1882	Quincy.....2d.	A. W. Harlan.....Chicago.	W. T. Magill, Rock Island	Edmund Noyes..Chicago.	E. C. Stone....Galesburg.	H. H. Townsend...Pontiac.
19	1883	Decatur.....1st.	E. C. Stone.....Galesburg.	J. J. R. Patrick, Belleville	Edmund Noyes..Chicago.	E. S. Talbot.....Chicago.	H. H. Townsend...Pontiac.
20	1884	Springfield..3d.	Edmund Noyes....Chicago.	H. H. Townsend, Pontiac	J. W. Wassall[4]..Chicago.	J. Campbell..Blooming'n	W. B. Woodward....Peoria.
21	1885	Peoria.....3d.	H. H. Townsend...Pontiac.	M. H. Patten, Springfield	J. W. Wassall[5]..Chicago.	C. R. Dwight....Danville.	J. W. Cormany..Mt. Carroll.
22	1886	Rock Island 3d.	T. L. Gilmer.....Quincy.	W. B. Woodward, Peoria.	J. W. Wassall[6]..Chicago.	C. B. Rohland.....Alton.	W. B. Ames.....Chicago.
23	1887	Jacksonville.2d	W. T. Magill..Rock Island.	C. B. Rohland.....Alton.	J. W. Wassall[7]..Chicago.	T. W. Prichett.Whitehall	W. B. Ames.....Chicago.
24	1888	Cairo.....1st.	C. B. Rohland.....Alton.	Chas. Henry, Jackson'lle.	Garrett Newkirk.Chicago	T. W. Prichett.Whitehall	W. B. Ames.....Chicago.
25	1889	Quincy.....3d.	Geo. H. Cushing...Chicago.	J. J. Jennelle.....Cairo.	Garrett Newkirk.Chicago	T. W. Prichett.Whitehall	W. B. Ames.....Chicago.
26	1890	Springfield.4th.	T. W. Prichett..Whitehall.	Kate C. Moody, Mendota.	Garrett Newkirk.Chicago	W. A. Stevens...Chicago.	D. M. Cattell.....Chicago.
27	1891	Bloomington 3d	Truman W. Brophy.Chicago	E. K. Blair.....Waverly.	Garrett Newkirk.Chicago	W. A. Stevens...Chicago.	F. H. McIntosh..Bloom'g'n
28	1892	Springfield.5th.	W. H. Taggart...Freeport.	Garrett Newkirk.Chicago	Louis Ottofy.....Chicago.	W. A. Stevens...Chicago.	F. H. McIntosh..Bloom'g'n

[1] Two meetings were held in Chicago, July and November; all succeeding meetings were held in May.
[2] These officers held over from the previous meeting, no election being held at the close of meeting of 1869.
[3] The officers acting at this and succeeding meetings were elected and installed at the close of the previous meeting.
[4] Assistant Secretary, W. H. Taggart, Freeport.
[5] Assistant Secretary, P. J. Kester, Chicago.
[6] Assistant Secretary, P. J. Kester, Chicago.
[7] Assistant Secretary, Louis Ottofy, Chicago.

LIST OF OFFICERS OF THE ILLINOIS STATE DENTAL SOCIETY.—CONTINUED.

Ann'l meeting.	Year.	Place.	President.	Vice-President.	Secretary.	Treasurer.	Librarian.
29	1893	Rock Isl'd..4th	E. K. Blair.....Waverly.	C. N. Johnson...Chicago.	Louis Ottofy....Chicago.	W. A. Stevens...Chicago.	F. H. McIntosh, Bloom'g'n
30	1894	Springfield..6th	Garrett Newkirk..Chicago.	J.W.Cormany.Mt.Carroll	Louis Ottofy....Chicago.	W. A. Stevens...Chicago.	F. H. McIntosh, Bloom'g'n
31	1895	Galesburg ...2d	J. W. Cormany.Mt. Carroll.	S. F. Duncan.....Joliet.	Louis Ottofy....Chicago.	W. A. Stevens...Chicago.	Grafton Munroe, Spring'ld
32	1896	Springfield..7th	W. A. Stevens ...Chicago.	C. R. Taylor....Streator.	Louis Ottofy....Chicago.	E. D Swain ....Chicago.	J. R. Rayburn...Fairbury.
33	1897	Peoria 4th	C. R. Taylor.....Streator.	E. B. David.....Aledo.	Louis Ottofy....Chicago.	E. D. Swain ....Chicago.	J. R. Rayburn...Fairbury.
34	1898	Springfield .8th	J. A. W. Davis..Galesburg.	W. A. Johnston...Peoria.	A. H. Peck.....Chicago.	E. D. Swain.....Chicago.	Grafton Munroe.Spring'ld
35	1899	Chicago.....5th	Chas. P. Pruyn...Chicago.	A S. Waltz .....Decatur.	A. H. Peck.....Chicago.	E. D. Swain.....Chicago.	G. A. McMillen.....Alton.
36	1900						
37	1901						
38	1902						
39	1903						
40	1904						
41	1905						
42	1906						
43	1907						
44	1908						
45	1909						
46	1910						
47	1911						
48	1912						
49	1913						
50	1914						
51	1915						
52	1916						
53	1917						
54	1918						
55	1919						
56	1920						
57	1921						
58	1922						
59	1923						
60	1924						
61	1925						
62	1926						
63	1927						
64	1928						
65	1929						
66	1930						
67	1931						
68	1932						
69	1933						

OFFICERS AND STANDING COMMITTEES.

OFFICERS, 1898-99.

President, CHAS. P. PRUYN.....Chicago.
Vice President, A. S. WALTZ.....Decatur.
Secretary, A. H. PECK.....Chicago.
Treasurer, E. D. SWAIN.....Chicago.
Librarian, G. A. MCMILLEN.....Alton.

EXECUTIVE COUNCIL, 1898-99.

Ex Officio..... CHAS. P. PRUYN, Chicago.
A. H. PECK, Chicago.
E. D. SWAIN, Chicago.

Terms expire 1899..... J. G. REID, Chicago.
R. N. LAWRANCE, Lincoln.
L. W. SKIDMORE. Moline.

Terms expire 1900..... GEO. H. CUSHING, Chicago.
E. H. ALLEN, Freeport.
A. S. WALTZ, Decatur.

Terms expire 1901..... J. CAMPBELL, Bloomington.
E. K. BLAIR, Waverly.
S. A. CAMPBELL, Mattoon.

STANDING COMMITTEES.

EXECUTIVE COMMITTEE.

D. M. CATTELL.....Chicago.

COMMITTEE ON PUBLICATION.

A. H. PECK, Chairman.....Chicago.
E. NOYES.....Chicago.
C. N. JOHNSON.....Chicago.

BOARD OF EXAMINERS.

C. B. ROHLAND, (term expires 1899).....Alton.
ROBERT GOEBEL, " " 1900).....Lincoln.
C. M. ROBBINS, " " 1901).....Carthage.

COMMITTEE ON DENTAL SCIENCE AND LITERATURE.

A. W. Harlan.....Chicago.

COMMITTEE ON DENTAL ART AND INVENTION.

J. E. Keefe.....Chicago.

COMMITTEE ON INFRACTIONS OF THE CODE OF ETHICS.

W. E. Holland.....Jerseyville.
W. A. Hoover.....Gibson City.
P. J. Kester.....Chicago.

CLINICS.

L. W. Skidmore, Supervisor.....Moline.

LOCAL COMMITTEE OF ARRANGEMENTS.

Garrett Newkirk.....Chicago.
J. H. Prothero.....Chicago.
H. J. Goslee.....Chicago.

CONSTITUTION AND BY-LAWS.

ARTICLE I.

Name.

This Society shall be called "The Illinois State Dental Society."

ARTICLE II.

Aims and Objects.

Its aims and objects are as follows: The elevation of the standard of professional education; the advancement and cultivation of dental science and literature, and the protection of the public from the evils of empiricism; the promotion of the honor, usefulness and interest of the dental profession and mutual fellowship and good feeling.

ARTICLE III.

Officers.

The officers of this Society shall consist of a President, Vice President, Secretary, Treasurer and Librarian, and such others as may be designated in the by-laws or standing resolutions.

ARTICLE IV.

Executive Council.

The management of this Society shall be vested in an Executive Council consisting of twelve active members of whom the President, Secretary and Treasurer shall constitute a part, and these shall be the officers of the Council.

ARTICLE V.

Duties of Executive Council—Election of President and Vice President, Appointment of all Other Officers, and Selecting Place of Next Meeting.

The Executive Council shall have exclusive control of all the business of the Society and their action shall be final, without review by the Society, except as otherwise provided.

At the morning session of the last day of the annual meeting the Society shall proceed to elect a President and Vice President by ballot. The first ballot shall be informal, and in no case shall a ballot be dispensed with.

The Council shall appoint or elect all other officers, and standing committees, and shall select the place of annual meeting. In case of the absence from the meeting of the President and Vice President or of any other officers, the Council shall appoint others to act in their places.

ARTICLE VI.

Election of Executive Council.

At the first election of the Executive Council held under the amended constitution, nine members shall be elected, who shall serve—three for one year—three for two years—and three for three years—their terms to be decided by lot after their election. At each subsequent annual meeting three members of the Council shall be elected by the Society to serve for three years.

ARTICLE VII.

Quorum.

Seven members of the Executive Council shall be necessary to constitute a quorum. If at any annual meeting a quorum should fail to be present, the members of the Council present shall appoint enough members of the Society to constitute with themselves a quorum, who shall serve until the arrival of the regular members of the Council.

ARTICLE VIII.

Members.

Section 1.—This Society shall consist of Active, Corresponding and Honorary Members.

Active Members.

Sec. 2.—The Active members shall consist of practitioners of dentistry residing in the State of Illinois (except as provided in Section 5, Article VII, of the By-Laws). They shall be twenty-one years of age, of good moral character, and shall have received a diploma from a respectable Medical or Dental College, or shall have been engaged three years in the practice of dentistry, including term of pupilage, and shall have passed a satisfactory examination before the Board of Examiners.

Corresponding Members.

Sec. 3.—Corresponding Members shall consist of practitioners of dentistry or medicine residing in this or other States of the Union, or in foreign countries, who manifest a disposition to advance the science and art of the profession by contributing to its literature.

Honorary Members.

Sec. 4.—Honorary Members shall consist of persons who have made valuable contributions to the science or art of dentistry, or have rendered important services to the profession.

ARTICLE IX.

Powers.

The Society shall use one common seal, with such device and inscription as it shall agree upon; and may, by vote of the Council, grant to its members such certificates as may authenticate their membership.

ARTICLE X.

Amendments.

The Constitution may be altered or amended, with the consent of two-thirds of the members of the Society present—the proposition stating the amendment (in writing) to be submitted by five members at an annual meeting and to lie over until the next annual meeting.

If the purpose and scope of such alterations or amendments be announced in writing at the annual meeting, or, if a general revision is desired to be made, and the society, or its executive council, shall appoint a committee to determine the details of such amendments, or to make such revision, the publication in the "Transactions" of such changes as are proposed to be made, or of such revised constitution, shall be deemed a sufficient compliance with the requirements of this section, and such proposed alterations, amendments, or revision, may be adopted or rejected at the next annual meeting thereafter.

BY-LAWS.

ARTICLE I.

OFFICERS.

Duties of the President.

Section 1.—The President shall preside at all meetings of the Society and Council, call special meetings of the Society at the request of ten active members, and of the Council at the request of three of its members; sign all diplomas, certificates, or letters testimonial; appoint all committees not otherwise provided for, and be *ex officio* a member of all standing committees.

Duties of the Vice President.

Sec. 2.—The Vice President shall, in the absence of the President, preside; and in case of the absence of both of these officers, a President *pro tempore*, shall be appointed by the Council.

Duties of the Secretary.

Sec. 3.—The Secretary shall keep minutes of all meetings, both of the Council and Society; notify officers and members of their election; give notice to members of all meetings; sign all diplomas, certificates and letters testimonial; receive all moneys due the Society from its members, and pay the same to the Treasurer, and certify to all official acts of the Society in connection with the President. He shall take charge of and conduct the correspondence of the Society, and shall keep a copy of all official letters he may write, with replies to the same. He shall be Chairman of the Publication Committee, and shall give a bond in amount as required by the Executive Council before entering upon his duties.

Duties of the Treasurer.

Sec. 4.—It shall be the duty of the Treasurer to keep all moneys of the Society committed to his trust; to pay them over by order of the President, countersigned by the Secretary, and keep a correct account of the same in a book pro-

vided for that purpose. He shall make a full and detailed report of the financial affairs of the Society at the annual meeting each year; and at the expiration of his term of office, he shall deliver to his successor all funds, papers and books relating thereto, and shall give bond in amount as required by the Executive Council before entering upon his duties.

Duties of the Librarian.

Sec. 5.—The Librarian shall have charge of all books and manuscripts belonging to the Society. He shall keep an accurate catalogue of the same, and shall report at the annual meeting the condition of the Library, and contributions made to it during the year.

Publication Committee.

Sec. 6.—The President shall appoint annually, after the election of officers, two members of the Society, who shall act in conjunction with the Secretary, as the Publication Committee.

They shall be authorized to employ a competent reporter to furnish an accurate report of the proceedings of each meeting.

They shall superintend the publication and distribution of such portions of the Transactions as the Council may direct, or the committee judge to be of sufficient value, and shall have full authority and power to cut down, amend or leave out such matter as they deem best for the proper preparation of the Transactions for publication.

They shall specify, in their annual report, the character and cost of the publications of the Society during the year, and the number of copies still on hand. Any report or other paper entitled to publication in the volume of the Transactions for the year in which it shall be presented to the Society must be placed in the hands of the Publication Committee on or before the last day of the annual meeting, and must be also so prepared that the proof sheets furnished the authors shall be returned without material alteration or addition.

Every paper received by this Society, and all plates and other means of illustration, shall be considered the exclusive property of the Society, and shall be published for its benefit.

Disclaimer.

This committee is hereby instructed to print, at the beginning of each volume of the Transactions, the following disclaimer, *viz.*; "The Illinois State Dental Society, although formally accepting and publishing the reports of the various committees, and the essays read before it, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

ARTICLE II.

Election of the Executive Council.

At the election held first after the adoption of this amended Constitution, nine persons shall be chosen by the Society for members of the Executive Council, to serve for terms of one, two and three years respectively, or until their successors are duly qualified, and thereafter three members shall be elected annually to serve three years.

They shall be nominated with special reference to their fitness by a committee of three, to be appointed by the President, and only confirmed by a two-thirds affirmative vote of the members of the Society present.

The election of new members of the Council annually shall be held on the morning of the last day's session, but those newly elected shall only enter upon their duties after the close of the annual meeting at which they were elected.

ARTICLE III.

Duties of Executive Council.

The Executive Council shall have the absolute control of the entire business of the Society—and shall sit with closed doors.

How Business Shall be Brought Before the Council.

Any member of the Society desiring to bring any matter of business before the Council must do so in writing, and may appear before them to advocate any such measure by consent of the Council.

Whom They Shall Elect and Appoint.

They shall annually elect a Secretary, Treasurer and Librarian and appoint the Executive Committee, one member of the Board of Examiners, a Committee of three on Ethics, a Supervisor of Clinics, the Committee on Dental Science and Literature, the Committee on Dental Art and Invention and a Local Committee of Arrangements.

Officers and Members of Old Committees to Hold Over.

The officers of the Society and the members of the Executive Committee, of the Board of Examiners and of the Committee on Dental Science and Literature aud of Dental Art and Invention who are in office at the time this constitution goes into effect shall continue in office till their full terms expire.

Auditing Committee.

The Executive Council shall annually appoint an Auditing Committee from their own number.

How Moneys Shall be Voted.

They shall vote no moneys to be paid for other than the legitimate expenses of the Society except upon a three-fourths vote of all the members of the Council present.

Presiding Officer not to Vote Except in Case of a Tie.

The presiding officer of the Council shall not vote on any question, except in case of a tie, when he shall cast the deciding vote.

ARTICLE IV.

Executive Committee, and Duties of same.

There shall be an Executive Committee of one to be appointed by the Executive Council annually, whose duty shall be to provide a suitable hall for meetings and prepare the program of scientific work and order of business for each annual session, and attend to such other business as the Council may direct.

ARTICLE V.

Duties of Board of Examiners.

The Board of Examiners shall satisfy themselves by examination, or in any other manner they may think necessary, of the reputable character and professional qualifications of all candidates for membership, and recommend for election such as they find to be worthy.

ARTICLE VI.

Vacancies in the Board of Examiners.

In case of the absence from any meeting of one or more members of the Board of Examiners, the Council shall appoint substitutes to act *pro tempore*, and in case of a vacancy, occurring by death or otherwise, they shall, at the earliest time practicable thereafter, appoint some member to fill the unexpired term of such vacating member.

ARTICLE VII.

Election of Members.

Section 1.—Candidates for membership must be proposed to the Board of Examiners, recommendations for the same being made in writing by two members of the Society, accompanied by the initiation fee, said fee being returnable to the applicant in case of rejection. The Board shall proceed to examine such candidates in accordance with the provisions of Article V. of these By-Laws, as early thereafter as practicable. Three-fourths of all the votes cast by the Council shall be necessary for the election of a member.

Sec. 2.—No person shall be entitled to the privileges of active membership until he shall have signed the Constitution and paid the initiation fees and dues. If he omit the same for one year his election shall be void.

Sec. 3.—No person having once been a member of this Society who has forfeited his membership by the nonpayment of his dues, shall be eligible to reëlection until the amount due from him at the time be was dropped be paid.

The names of all candidates recommended by the Board of Examiners for active membership shall be posted conspicuously in the room where the Society meets, and shall not be voted on until the daily session of the Council next following the posting.

Any member of the Society knowing of any reason why a candidate for membership should be rejected, shall notify the Board of Examiners and the Council through its presiding officer, in writing of such reasons.

Any candidate for membership who has once been voted upon and rejected, shall not have his name proposed again until the next annual meeting.

Corresponding and Honorary Members—How Elected.

Sec. 4.—The names of candidates for Corresponding or Honorary membership shall be presented to the Board of Examiners only upon the recommendation of ten active members.

The Board shall recommend them for election only after satisfying themselves that they have the qualifications provided for in Secs. 3 and 4, Article VIII.

of the Constitution ; and such names shall upon no occasion be presented to the Council, except by the Board of Examiners, who shall, in reporting names for Corresponding or Honorary membership, state what work the candidates have done entitling them to be so presented.

If any Corresponding member shall enter upon the practice of dentistry in this State, his corresponding membership shall thereupon cease.

Active Members Removing from the State.

Sec 5.—Active members removed from the State may retain their membership by notifying the Secretary of their desire to be placed upon a list of non-resident members, and by regularly paying an annual fee of one dollar. Those having lost their membership by removal, if still in reputable practice, may be elected non-resident members.

ARTICLE VIII.

Initiation Fee and Annual Dues.

Section 1.—The initiation fee shall be five dollars. The annual dues shall be five dollars, payable in advance, on the morning of the first day's session of the annual meeting. No member shall be entitled to the privileges of the floor until his dues are paid. Any member who neglects to pay his annual dues two successive years, shall cease to be a member without action of the Society, *provided* the Secretary has notified him of his indebtedness.

What Members are or may be Exempt from Dues.

Corresponding and Honorary members shall be exempt from the payment of all dues; and as a mark of honor for distinguished services in the profession, by special action of the Society, the dues of an active member may be remitted. An active member having paid annual dues for twenty-five consecutive years, shall be constituted a life member, and shall be exempt from payment of dues.

ARTICLE IX.

Duties and Privileges of Members.

Section 1.—An active member shall not accept a student for a less period than three years, and shall require each student to give a written obligation to graduate at some regularly organized dental college before he assumes the responsibilities of a dental practitioner.

Sec. 2.—Active members shall be entitled to debate and vote on all questions discussed in the Society, and eligible to any office in its gift, provided their dues are fully paid.

Sec. 3.—Corresponding and Honorary members shall be entitled to a seat in meetings of the Society, and have the privilege of debating all questions of a professional or scientific character.

ARTICLE X.

Resignation or Expulsion of Members.

Section 1.—Any member shall have leave to resign (except in cases of impeachment), upon application made therefor in writing; *provided* all arrears due from him to the Society have been discharged.

SEC. 2.—Any member may be impeached by three members, for violating the laws of this Society, for malpractice, or other gross misconduct. All charges shall be made in writing with specifications, clearly setting forth each violation of the code of ethics governing this body. The member so impeached shall have transmitted to him a written copy of the impeachment, with notice of the time of hearing, before a committee of five members appointed for that purpose; then if the report of said committee sustain such impeachment, the Council, at the next regular meeting, may, by ballot, suspend or expel such member, by a majority of three-fourths of all the votes cast.

COMMITTEE ON ETHICS.

SEC. 3.—There shall be appointed annually, by the Executive Council, a Committee on Ethics, to consist of three members, to whom all complaints shall be submitted, and through whom alone shall cases of infractions of the code be brought before the Council.

ARTICLE XI.

No member shall speak on any question unless his dues are paid, and until his name has been announced by the presiding officer, nor shall any one speak more than twice upon one subject, nor to exceed fifteen minutes in all, unless by affirmative vote of the Society.

ARTICLE XII.

ANNUAL MEETINGS.

SECTION 1.—The annual meeting shall be held in May, commencing on the second Tuesday at 10 o'clock A. M., and shall be devoted to the reading and discussion of papers and such other business as shall relate to the interests of the profession, concluding with the election of officers during the last daily session. Ten active members shall be necessary to constitute a quorum for the transaction of business at any meeting of this Society.

The Executive Council shall meet at 9 o'clock A. M., preceding the meeting of the Society, and shall hold a session before each daily session of the Society if necessary. They may be called together at any time during the year by the President, upon the request of three members of the Council.

SEC. 2.—None but members of this Society shall be present during elections; *provided* an active member of the Society calls for the enforcement of this section.

SEC. 3.—It shall be the duty of the Society at each regular meeting, to appoint one of its members to deliver an address at the next regular meeting.

ARTICLE XIII.

ALTERATIONS OR AMENDMENTS.

SECTION 1.—These By-Laws may be altered or amended at any regular meeting by a vote of two-thirds of the members of the Society present, *provided* said alteration or amendment shall have been presented at a previous meeting.

If the purpose and scope of such alterations or amendments be announced in writing at the annual meeting, or, if a general revision is desired to be made, and

the society, or its executive council, shall appoint a committee to determine the details of such amendments, or to make such revision, the publication in the "Transactions" of such changes as are proposed to be made, or of such revised By-Laws, shall be deemed a sufficient compliance with the requirements of this section, and such proposed alterations, amendments, or revision, may be adopted or rejected at the next annual meeting thereafter.

ARTICLE XIV.

Rules of Order.

Robert's Rules of Order shall be the Code of this Society.

ARTICLE XV.

This Constitution shall go into effect immediately upon its adoption, and it shall be the duty of the presiding officer at once to appoint a Nominating Committee, as provided in Article II. of the By-Laws, and said committee shall as soon thereafter as possible present the names of the Executive Council, and the vote be then immediately taken.

STANDING RESOLUTIONS.

Supervisor of Clinics.

Resolved, That a Supervisor of Clinics shall be appointed annually by the Executive Council to serve one year.

The duties of such Supervisor shall be to make all arrangements for the holding of clinics, to have charge of the clinic rooms, fixtures, etc., and to determine who may or may not operate, what operations shall be performed, etc., etc. He shall keep a record of all operations in a book provided for that purpose, and shall report to the Society annually at the second daily session after the holding of the clinics.

His report shall contain as thorough a criticism of each operation as possible, setting forth all the steps he may have deemed incorrect or otherwise, a statement of what he would have thought a better method, and his reasons therefor—to the end that profitable and instructive discussion may follow. He shall also report, as far as possible, the condition of operations made at the clinics of previous years.

He may appoint one or more assistants, as may be required.

He shall notify each clinical operator to supply himself with all needed instruments and appliances for the proper performance of his operations, and request him to select for himself an assistant.

Alternates shall also be selected and notified.

Duties of Librarian.

Resolved, That after this date (May 1885), it shall be the duty of the Librarian to obtain cabinet photographs, so far as possible, of all the members of this Society deceased. and likewise of the present members, and to properly arrange the

same in suitable albums to be procured by him; and the photographs of future members shall be added to the collection.

The Librarian shall be the custodian of these albums, and shall bring them to each annual meeting for the inspection of the members.

Resolved, That the following Committees be created:

COMMITTEE ON DENTAL SCIENCE AND LITERATURE.

First, a Committee consisting of one member on Dental Science and Literature, whose duty it shall be to report annually, on the first day of the annual meeting, on the progress of science and literature as appertaining to dentistry and give a resumé of all that may be new and important.

COMMITTEE ON DENTAL ART AND INVENTION.

Second, a Committee consisting of one member on Dental Art and Invention, whose duty shall be to report on the first day of each annual meeting, the advance made during the year in the arts and inventions appertaining to dentistry. This Committee shall exhibit the new devices and methods pertaining to the practice of dentistry, which are brought before the Society, in a room specially provided for that purpose.

The member of this committee shall be selected with reference to his special fitness for those duties, and be appointed by the Council.

The term of office shall be one year.

DISTRIBUTION OF TRANSACTIONS.

Resolved, That the official transactions shall not be supplied to members in arrears for annual dues; but it shall be the duty of the Secretary to notify all delinquents of this action previous to the publication of the transactions.

Resolved, That the members of the Publication Committee shall have the power to make such arrangements as in their judgment they deem proper looking toward the publication of the transactions for the succeeding year.

CODE OF ETHICS.

ARTICLE I.

SECTION 1. The dentist should be ever ready to respond to the reasonable wants of his patrons, and should fully recognize the obligations involved in his duties toward them. As, in many cases, they are unable to comprehend the operation or service performed, or to correctly estimate its value, the practitioner must be guided by his own sense of right, in treating the case as his superior knowledge dictates. His manner should be gentle and sympathetic, and yet sufficiently firm to enable him to secure the best results of his skill. He should gain the confidence of his patrons, not alone by the skillful performance of difficult operations, but also by attending carefully and conscientiously to the simpler cases committed to his care.

SEC. 2. The dentist, without being obtrusive or pedantic, should impart such information to his patrons as his opportunities afford him in regard to the causes and nature of the disease in the teeth, or adjacent parts, which he may be called upon to treat; and should explain to them the importance of availing them-

selves of such timely preventives or remedies as he may deem necessary to their welfare. He should also communicate such general information as shall enable them to exercise an intelligent appreciation of what the profession aims to accomplish.

SEC. 3. The dentist shall be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which they have a right to expect.

ARTICLE II.

SECTION 1. Every member of the dental profession is bound, as such, to maintain the honor and integrity of the profession. To this end, he should himself be upright and courteous in his intercourse with the public and his brethren in the profession.

SEC. 2. It is unprofessional to resort to public advertisements, such as cards, handbills, posters or signs calling attention to peculiar styles of work, prices for services, special modes of operating, or to claim superiority over neighboring practitioners; to publish reports of cases, or certificates in the public prints; to go from house to house soliciting or performing operations; to circulate or recommend nostrums, or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by card, simply their names, occupation, and place of business; or in the same manner to announce their removal, absence from, or return to business; or to issue, to their patients appointment cards, with a fee bill for professional services thereon.

SEC, 3. The dentist, when applied to, for merely advice or temporary relief, by the patient of a reputable practitioner, whose services at that time he is unable to procure, should guard against disparaging the family dentist by hints, inquiries, or any other means calculated to weaken the patient's confidence in him. At the same time the dentist should not, from too high a sense of professional courtesy to his neighboring practitioner, allow the interests of persons so applying for counsel or service, to be jeopardized.

SEC. 4 And it shall be regarded as unprofessional to warrant operations or work as an inducement to patronage.

ACTIVE MEMBERS, 1898.

Name.	Address.	Elected.
Adams, W. J.	Knoxville	1897
Aigley, J. E.*	Farmington	1897
Allen, E. H.*	Freeport	1883
Ames, W. V-B.*	34 Washington St., Chicago	1884
Antes, R. H., *Life Member*	Geneseo	1873
Baker, Hester J.	Quincy	1894
Bandy, O. L.*	LaSalle	1898
Barcus, J. M.*	Carlinville	1889
Barnett, H. K.	Upper Alton	1896
Bentley, C. E.	100 State St., Chicago	1895
Black, G. V.,* *Life Member*	146 Franklin St., Chicago	1868
Blair, E. K.*	Waverly	1887
Bridges, J. S.*	92 State St., Chicago	1898
Brigham, E. T.*	Watseka	1889
Brophy, T. W.*	126 State St., Chicago	1876
Brown, A. E.	1911 Michigan Ave., Chicago	1882
Brown, J. B	Bloomington	1892
Brunson, G. M.*	Joliet	1897
Bull, H. B.*	Fairbury	1892
Campbell, J.*	Bloomington	1875
Campbell, S. A.*	Mattoon	1886
Carey, A. B.*	Pittsfield	1898
Carey, G. B.*	Perry	1897
Carpenter, E. R.*	18 Van Buren St., Chicago	1895
Carpenter, Geo. T.	103 State St., Chicago	1897
Case, C. S.*	92 State St., Chicago	1894
Cattell, D. M.	92 State St., Chicago	1889
Chenoweth, A. W	Atlanta	1897
Cigrand, B. J.*	475 West North Ave., Chicago	1893
Cigrand, P. J*	718 South Halsted St., Chicago.	1896
Clark, A. B.*	34 Washington St., Chicago	1876
Clusman, L.	360 Blue Island Ave., Chicago	1892
Colhamer, Chas. E.	Peoria	1897
Collins, J. W.*	Lincoln	1883
Condon, A. P.*	Springfield	1898
Conkey, F. M.*	Homer	1895
Cook, Geo. W	47th and Kenwood Ave., Chicago	1894
Corbett, C. C.*	Edwardsville	1892
Cormany, J. W.*	Mt. Carroll	1878

*Present.

Name.	Address.	Elected.
Corwin, J.*	737 W. Madison Street, Chicago	1895
Coulson, D. E	Galesburg	1890
Crawford, S. W	108 Washington Ave., Chicago	1897
Crissman, Ira B	92 State St., Chicago	1890
Crouse, J. N.* *Life Member*	2231 Prairie Ave., Chicago	1865
Cummins, J. T	Metropolis City	1888
Curry, J. A.	Streator	1892
Curtis, W. W.*	34 Washington St., Chicago	1897
Cushing, G. H., *Life Member*	31 Washington St., Chicago	1865
David, E. B., *Life Member*	Aledo	1873
David, G. L	Aledo	1896
Davis, J. A. W.* *Life Member*	Galesburg	1872
Davis, K. B.* *Life Member*	Springfield	1869
Davis, L. L.*	103 State St., Chicago	1885
Daymude, O. M.*	Monmouth	1893
Dennis, G. J	257 31st St., Chicago	1890
Devlin, J. B.*	2204 Michigan Ave., Chicago	1897
Dicus, J. B.*	70 State St., Chicago	1898
Dillon, E. H.*	Elmwood	1897
Dillon, G. B.*	Sterling	1886
Dorn, C. P	Naperville	1880
Duncan, E.*	Jacksonville	1877
Duncan, S. F.*	Joliet	1881
Dunn, J. Austin	31 Washington St., Chicago	1887
Edmonds, N. D.*	100 State St., Chicago	1898
Eiles, F. Stanley	Blue Island	1893
Entsminger, G. W	Carbondale	1888
Farmer, H. B.*	East St. Louis	1898
Fischer, Vincent	570 Blue Island Ave., Chicago	1892
Frazee, O. L.*	Springfield	1897
Freeman, A. B	34 Washington St., Chicago	1889
Freeman, A. W., *Life Member*	34 Washington St., Chicago	1865
Freeman, D. B., *Life Member*	92 State St., Chicago	1872
Gallie, Don M	100 State St., Chicago	1894
Gardiner, F. H	31 Washington St., Chicago	1877
Gilmer, A. L	Quincy	1895
Gilmer, Thos. L.* *Life Member*	126 State St., Chicago	1872
Gluesing, J. W	Moline	1893
Goebel, Robert*	Lincoln	1884
Good, Robert*	126 State St., Chicago	1898
Gordon, Byron	Moline	1893
Goslee, H. J.*	Madison St. and Ogden Ave., Chicago	1897
Green, W. F.*	South Evanston	1892
Griffin, E. B	East St. Louis	1897
Guffin, E. L., *Life Member* (*vote* 1889)	Geneseo	1882
Gunther, H. Alfred*	3300 Cottage Grove Ave., Chicago	1892

*Present.

Name.	Address.	Elected.
Hancock, J. E	126 State St., Chicago	1897
Hanaford, M. L.*	Rockford	1878
Hare, D. A.*	163 State St., Chicago	1898
Harlan, A. W., *Life Member*	Masonic Temple, Chicago	1872
Harned, M. R.*	Rockford	1898
Harper, W. E.*	3456 Wabash Ave., Chicago	1893
Harris, A. J	279 Warren Ave., Chicago	1886
Hazell, E. F.*	Springfield	1898
Hebert, A. W	31 Washington St., Chicago	1894
Henderson, G. H.*	Springfield	1896
Henderson, L. D	Evanston	1896
Henry, T. F	Streator	1896
Herbert, Frank Y.*	Ottawa	1897
Hewes, C. T	Quincy	1896
Hinkins, J. E.*	131 53d St., Chicago	1888
Hodgman, C. W	Princeton	1897
Holland, W. E.*	Jerseyville	1889
Honsinger, E., *Life Member*	318 Park Ave., Chicago	1865
Hoover, W. A.*	Gibson City	1897
Houston, J. T	Peoria	1897
Hunn, R. G.*	Springfield	1898
James, Austin F	Oak Park	1895
James, P. R	Ottawa	1897
Johnson, C. N.*	31 Washington St., Chicago	1886
Johnson, I. B.*	Onarga	1898
Johnston, W. A.*	Peoria	1891
Kane, J. K	Pinckneyville	1896
Kasbeer, J. W	Normal	1897
Keefe, J. E.*	34 Washington St., Chicago	1888
Kester, P. J.*	126 State St., Chicago	1882
Kimball, R. H.*	34 Washington St., Chicago	1898
Kitchen, C. A., *Life Member*	Rockford	1865
Koch, C. R. E., *Life Member*	213 31st St., Chicago	1867
Lakin, S. W.*	Eureka	1895
Lamereaux, J. M	Galesburg	1895
Lane, F. A.*	Macomb	1898
Lawrance, R. N.*	Lincoln	1879
Leake, C. W	2454 Indiana Ave., Chicago	1894
Lickly, J. J	Morris	1897
Lowry, F. M	Delavan	1897
Lumpkin, I. A	Mattoon	1886
Magill, W. T., *Life Member*	Rock Island	1871
Magnisson, J. E	Orion	1897
Maguire, J. R.*	Lewistown	1897
Mariner, J. Frank, *Life Member*	31 Washington St., Chicago	1872
Markle, A. M.*	96 State St., Chicago	1898

*Present.

Name.	Address.	Elected.
Marshall, J. S	34 Washington St., Chicago	1883
Martin, W. C.	Peoria	1881
Matteson, A. E., *Life Member*	3700 Cottage Grove Ave., Chicago	1869
Matteson, C. F., *Life Member*	50 35th St., Chicago	1872
Merriman, C. J.	92 State St., Chicago	1891
Miller, G. A.*	346 E. 63d St., Chicago	1898
Moorhead, W. W.*	Aledo	1895
Munroe, Grafton*	Springfield	1890
McCandless, A. W.	126 State St., Chicago	1892
McDaniel, J. A.	Princeton	1897
McDonough, Martin L.	Winchester	1897
McIntosh, F. H.*	Bloomington	1884
McLean, F. R	Danville	1897
McMillan, H. W.	Roseville	1897
McMillen, Geo. A.*	Alton	1891
McMillen, J. D.*	Macomb	1897
Morrow, W. J.*	Bushnell	1898
Newcomer, A. I.*	Beardstown	1898
Newkirk, Garrett*	31 Washington St., Chicago	1880
Newsome, B.	Minonk	1894
Nicol, J. D.*	Peoria	1898
Noyes, Edmund,* *Life Member*	92 State St., Chicago	1872
Noyes, F. B.*	92 State St., Chicago	1895
Nyman, J. E.*	34 Washington St., Chicago	1894
Oakey, A. J.	63d St. and Stewart Ave., Chicago	1892
Ormsbee, W. W., *Life Member*	Geneva	1865
Ottofy, Louis*	Masonic Temple, Chicago	1881
Overholser, W. A.	Milledgeville	1897
Patterson, F. J.	Mendota	1896
Pearce, R. M.	Rock Island	1891
Peck, A. H.*	92 State St., Chicago	1890
Peters, C. F.	Peoria	1897
Peters, E. H.*	Peoria	1897
Pfeifer, Josephine D.*	Masonic Temple, Chicago	1894
Porter, C. A.	Eureka	1897
Potter, Samuel H.	Dwight	1897
Potts, H. A.*	Bloomington	1897
Powell, C. B.*	Jacksonville	1894
Pritchett, T. W.*	White Hall	1877
Primrose, F	Springfield	1892
Prothero, J. H.	146 Franklin St., Chicago	1896
Pruyn, C. P.*	100 State St., Chicago	1876
Pyper, P. A.*	Pontiac	1898
Rayburn, J. R.*	Fairbury	1890
Reed, J. J.	Rockford	1896
Reese, C. N.*	1006 E. Garfield Blvd., Chicago	1898

*Present.

Name.	Address.	Elected.
Reid, J. G.*	126 State St., Chicago	1882
Reid, J. H	Bloomington	1897
Ried, J. D.*	Pana	1898
Robbins, E. M.*	Carthage	1882
Roberts, N. J	Waukegan	1886
Rohland, C. B.*	Alton	1874
Royce, E. A	721 Washington Boul., Chicago	1886
Rue, A. W	Alton	1897
Salomon, G. S	Masonic Temple, Chicago	1885
Salter, G. B., *Life Member*	31 Washington St., Chicago	1871
Sawyer, C. B.*	Jacksonville	1887
Schermerhorn, W. W.*	Jacksonville	1898
Schuhmann, H. H	103 State St., Chicago	1892
Schwartz, G. W.*	34 Washington St., Chicago	1898
Shedd, J. W.*	Pontiac	1897
Sitherwood, G. D.*	Bloomington	1880
Skidmore, L. W.*	Moline	1891
Smith, Arthur G	Peoria	1896
Smith, C. F.*	Masonic Temple, Chicago	1898
Smith, Geo. E.*	Byron	1897
Smyser, J. H.*	70 State St., Chicago	1898
Sprinkle, J. M	Nokomis	1893
Spurrier, Jennie G.*	Springfield	1898
Stafford, F. H	490 W. Madison St., Chicago	1896
Stevens, W. A.*	2361 Wabash Ave., Chicago	1876
Stewart, E. H	Joliet	1890
Stewart, L. K.*	103 State St., Chicago	1897
Stone, E. C.* *Life Member*	Galesburg	1866
Swain, Edgar D.* *Life Member*	92 State St., Chicago	1867
Taggart, W. H	Masonic Temple, Chicago	1880
Taylor, C. R	Streator	1880
Thayer, C. H	92 State St., Chicago	1885
Thomas, Geo. A.*	126 State St., Chicago	1897
Thompson, C. N	3017 Michigan Ave., Chicago	1894
Thompson, Florence E.*	Masonic Temple, Chicago	1896
Tibbets, C. J.*	Quincy	1882
Tobey, W. W	Danville	1889
Trompen, C. N	Roseland	1892
Waltz, A. S.*	Decatur	1877
Warren, G. E	Pontiac	1895
Wassall, J. W.*	92 State St., Chicago	1882
Watson, A	Galesburg	1896
Webb, G. D	Wilmington	1896
Wellman, H. W	Quincy	1896
West, C. H.*	Farina	1892
Whipple, Henry L.*	Quincy	1896

*Present.

Name.	Address.	Elected.
Widenham, J. C.*	Jacksonville	1874
Wikoff, B. D	Masonic Temple, Chicago	1888
Williams, L. M	144 Oakwood Boul., Chicago	1897
Wilson, Orville W	Carrollton	1897
Wolf, H. M	Kewanee	1895
Wonderly, T. G	Galena	1881
Woolley, J. H.*	100 State St., Chicago	1877
York, E. Lawley*	126 State St., Chicago	1897
Yorker, F. V.*	48 43d St., Chicago	1892

Total, 231. Number present, 119.

NONRESIDENT MEMBERS.

Christmann, Geo. A	Cliff House, Manitau, Col.†	1881
Kraus, Maurice	1 Singer Strasse 10, Vienna, Austria	1895
LeCron, D. O. M	Union Trust Building, St. Louis, Mo.	1892
Timerman, E. C	1169 Broadway, Oakland, Cal	1896
Warner, E. R	California Bldg., Denver, Colo	1882

Total, 5. Number present, 0.

CORRESPONDING MEMBERS.

Anderson, Eli W	15½ E. Washington St., Indianapolis, Ind.	1887
Baldwin, C. V.	Los Angeles, Cal	1885
Barrett, W. C.	208 Franklin St., Buffalo, N. Y	1881
Bowman, G. A	2602 Locust St., St. Louis, Mo	1881
Bronson, Geo. A	3201 Washington Ave., St. Louis, Mo	1881
Cochran, R. L	Burlington, Iowa	1885
Cunningham, Geo	2 King's Parade, Cambridge, England	1888
Custer, Levitt E.*	Dayton, Ohio	1896
Dean, F. W	Des Moines, Iowa	1884
French, D. Gale	Pittsburg, Pa	1881
Fuller, A. H	Columbia Building, St. Louis, Mo	1880
Grevers, J. E	13 Oude Turf Markt, Amsterdam, Holland	1888

*Present.
†Chicago address, 507 LaSalle Avenue.

Name.	Address.	Elected.
Harper, John G.	800 Pine St., St. Louis, Mo.	1892
Hughes, E. E.	Des Moines, Iowa	1885
Hurtt, J. M.	Pomona, Cal.	1890
Kennerly, J. H.*	Grand and Franklin Aves., St. Louis, Mo.	1897
Levett, M. M.	10 Boul. des Capucines, Paris, France	1888
Moody, J. D	Los Angeles, Cal.	1894
Moody, Kate C.	Los Angeles, Cal.	1894
Morrison, John B.	9 When Block, Indianapolis, Ind.	1882
Patrick, Geo.	Bolton, England	1890
Reed, J. W.	Butte City, Mont.	1883
Stutenroth, C. W.	Watertown, S. D	1884
Sylvester, A. H.	2 Sommer Strasse, Berlin, Germany	1888
Templeton, J. G.	Pittsburg, Pa.	1881
Tomes, Charles S.	39 Cavendish Square, London, England	1888
VanMarter, J. G.	Tacoma, Wash	1888
Walker J.	22 Grosvenor Street, London, England	1888

Total, 28. Number present, 2.

HONORARY MEMBERS.

Brewer, F. A.	San Francisco, Cal.	1869
Butler, C. R	Cleveland, Ohio	1874
Chase, H. S., (deceased)	910 Olive St., St. Louis, Mo.	1869
Chittenden, C. C.	Madison, Wis.	1872
Crowley, C. Geo.	1358 Lexington Ave., New York City	1885
Hardtner, J.	Springfield, Ill.	1877
Miller, W. D	46 Voss Strasse, Berlin, Germany	1885
Morrison, James B.	1422 Baltimore Ave., Kansas City, Mo.	1869
McKellops, H. J.	3548 Lindell Ave., St. Louis, Mo.	1868
Porre, R. J.	278 Race St., Cincinnati, Ohio	1868
Rathbun, R. S.	Clinton, Iowa	1872
Taft, J.	Elm and Shillito Ave., Cincinnati, Ohio	1874
Wilson, I. P	Burlington, Iowa	1874

Total, 12. Number present, 0.

ROLL OF HONOR.

Specially Honored by the Society.

Black, G. V. ..... 1889 Cushing, Geo. H.* 1889

*Present.

RESUME.

	Total.	Present.
Active Members in Illinois (except Chicago), *Life*, 9	138	70
Chicago, *Life* 15	93	49
Nonresident Members	5	0
Corresponding Members	28	2
Honorary Members	12	0
	276	121

MINUTES

OF THE

ILLINOIS STATE DENTAL SOCIETY

MEETING OF 1898.

FIRST DAY—TUESDAY, MAY 10—Morning Session.

The thirty-fourth annual meeting of the Illinois State Dental Society was called to order by the President, Dr. J. A. W. Davis, at 10:20 A. M. in the Supreme Court room of the Capitol Building.

Calling of the roll was dispensed with for the day.

Prayer was offered by Dr. Edmund Noyes.

The address of welcome by his Excellency, John R. Tanner, Governor of the State of Illinois, was dispensed with, he not being able to attend.

It was moved by Dr. Louis Ottofy that the Secretary be instructed to send a suitable message to Dr. George H. Cushing, he being absent for the first time from the opening exercises of the Society.

Motion supported and carried.

Dr. E. D. Swain read a letter from Dr. Cushing. It was moved by Dr. Swain that said letter be incorporated in the minutes of this meeting.

Motion supported and carried.

FOLLOWING IS THE LETTER.

April 29, 1898.

My Dear Friends of the Illinois State Dental Society:

I find myself, owing to ill health, obliged to go away from Chicago to remain permanently.

I had hoped to be with you at this meeting, but I cannot stay except at great risk, but I feel that I must have a word of good-bye.

None of you can know what it costs me to say good-bye to you and to sever the personal relations with you, which have become so dear to me through these long years.

But there is much comfort to me in knowing that the young men of the profession are giving such splendid promises for the future.

Such papers as some of those by young men at our last meeting assure us that the Illinois State Society will always stand as the exponent of the highest professional attainment both in science and in art.

While this is the saddest time of my professional life it is also the proudest, as having shown me the respect and affection of my professional brethren through manifold kindness, the memory of which will cheer me to the end.

My interest in this Society will continue unabated and you must think of me as present with you in spirit on all occasions, and as watching with peculiar interest the development of these promising young men.

May God bless you one and all and may you live up to the traditions of the Society, carrying its banner of progress ever in the front, and I hope to live to see this to be acknowledged as the very first dental society on the earth.

Very affectionately and fraternally yours till death,

GEO. H. CUSHING.

It was moved by Dr. T. W. Brophy that a committee of five be appointed to draft suitable resolutions, the same to be engrossed and presented to Dr. Cushing.

Motion supported and carried.

In the absence of the Vice President, Dr. W. A. Johnston, Dr. E. D. Swain was called to the chair. The annual address of the Society was then read by the President, Dr. J. A. W. Davis.

The discussion was participated in by Drs. C. N. Johnson, Edmund Noyes, Garrett Newkirk, J. W. Cormany, T. W. Brophy, E. K. Blair, E. H. Allen, Grafton Munroe, G. H. Henderson, J. G. Reid, G. D. Sitherwood, G. W. Shryock, Ft. Wayne, Ind., T. W. Pritchett, P. J. Kester, L. W. Skidmore, J. N. Crouse, G. V. Black, R. N. Lawrance and T. L. Gilmer. The discussion was closed by the President.

Dr. E. K. Blair, Supervisor of Clinics, made an announcement regarding his work.

Dr. G. V. Black explained what was desired regarding test fillings of amalgam to be made during the afternoon.

Communications from Drs. A. W. Harlan, of Chicago, and G. H. Bowman, of St. Louis, in which each gentleman expressed his inability to attend the meeting, were read.

Moved and carried, the Society adjourn to meet at 2 P. M.

AFTERNOON SESSION.

The Society was called to order by the President at 2:30 o'clock.

Minutes of the previous session were read and approved.

The Secretary then announced the election to membership of E. F. Hazell, D. D. S., Springfield; J. B. Dicus, D. D. S., Chicago; N. D. Edmonds, D. D. S., Chicago; R. H. Kimball, D. D. S., Chicago, and R. G. Hunn, D. D. S., Springfield.

The annual report of the Committee on Dental Science and Literature, by Dr. A. W. Harlan, Chairman, was read by Dr. Ottofy.

The report was discussed by Dr. J. W. Cormany.

It was moved by Dr. J. E. Keefe that the report be accepted.

Motion supported and carried.

Dr. J. E. Keefe, Chairman of Committee on Dental Art and Invention, read his annual report, and presented samples of various new appliances.

It was moved and carried that the report be accepted and the subject passed.

Dr. Chas. P. Pruyn then read his paper, subject, "Amalgam."

The discussion was opened by Dr. T. W. Pritchett.

It was moved by Dr. Edmund Noyes that Dr. E. H. Allen take the chair while Dr. W. A. Johnston, who was presiding, present his remarks on the discussion of this paper.

Motion supported and carried.

The discussion was continued by Drs. W. A. Johnston, E. H. Allen, W. A. Stevens and G. V. Black.

Dr. E. K. Blair suggested that the discussion be continued at the next session, and moved the Society adjourn to meet Wednesday, at 2 P. M.

Motion was supported.

Dr. F. B. Noyes made an explanation regarding the test fillings to be made with amalgam. The motion to adjourn was then carried.

SECOND DAY—WEDNESDAY, MAY 11—AFTERNOON SESSION.

The session was called to order by the President at 2:30 o'clock.

Minutes of the previous session were read and approved.

The Secretary announced the appointment of Drs. T. W. Brophy, E. D. Swain, T. W. Pritchett, Garrett Newkirk and E. B. Rohland as a committee to prepare resolutions to be presented to Dr. Cushing. Also the appointment of Drs. G. V. Black, Geo. A. McMillen and T. W. Pritchett as Committee on Necrology. Also the election to membership of W. W. Schermerhorn, D. D. S., Jacksonville; J. S. Bridges, D. D. S., Chicago; I. B. Johnson, D. D. S., Onarga; G. A. Miller, D. D. S., Chicago; A. M. Markle, D. D. S., Chicago; P. A. Pyper, D. D. S., Pontiac; J. H. Smyser, D. D. S., Chicago, and A. P. Condon, D. D. S., Springfield.

Dr. J. N. Crouse made an announcement regarding the Dental Protective Association.

The discussion on Dr. Pruyn's paper was taken up and continued by Drs. T. W. Brophy, J. N. Crouse, C. N. Johnson, R. H. Kimball, Garrett Newkirk and G. V. Black.

It was moved by Dr. E. H. Allen, the subject be passed after the essayist, Dr. Pruyn, closed the discussion.

Motion supported and carried.

Dr. E. Lawley York read his paper, subject, "Why Coagulants Diffuse Through Dentine."

The President announced that the evening session would be held in Representative Hall.

Dr. Crouse announced that he wanted to meet the members of the Protective Association immediately after adjournment of the afternoon session.

Dr. J. E. Hinkins then opened discussion on Dr. York's paper. The discussion was continued by Drs. J. G. Reid, W. V-B. Ames, Louis Ottofy, Garrett Newkirk, Edmund Noyes and G. V. Black.

The President announced that Dr. C. S. Case would read his paper at the evening session; also that the roll would be called at the opening of the evening session.

Dr. Allen explained necessity of making changes in the order of program.

Further discussion of Dr. York's paper was postponed till the evening session.

On motion, the Society adjourned to meet at 8 P. M.

Evening Session.

Called to order by the President at 8:20 o'clock.

Minutes of the previous session were read and approved.

The Secretary announced the election to membership of D. A. Hare, D. D. S., Chicago; G. W. Schwartz, D. D. S., Chicago; Robert Good, D. D. S., Chicago; J. D. Reid, D. D. S., Pana; H. B. Farmer, D. D. S., East St. Louis; W. J. Morrow, D. D. S., Bushnell; Chas. F. Smith, D. D. S., Chicago; Jennie S. Spurrier, Springfield; F. A. Lane, D. D. S., Macomb; A. B. Carey, Jr., D. D. S., Pittsfield; J. D. Nicol, D. D. S., Peoria; O. S. Bandy, D. D. S., Lasalle; C. N. Reese, D. D. S., Chicago, and M. R. Harned, D. D. S., Rockford.

By direction of the Council, Dr. E. D. Swain presented the following resolution :

Resolved, That the Executive Council recommend to this Society that it, in conjunction with the New York State Dental Society, endorses the appeal to Congress to remedy the existing evils relating to patenting of instruments and appliances for use by scientific professions, and hereby appropriates the sum of fifty dollars to be used for legitimate expenses in securing such legislation.

On motion, the resolution was adopted.

Dr. A. S. Waltz presented a resolution to the effect that the dues of all members of this Society who have enlisted in the service of the United States be remitted so long as they continue in such service.

On motion, the resolution was adopted.

By direction of the Council, Dr. J. G. Reid presented a resolution to the effect that the President appoint a committee to draft a suitable memorial, the same to be engrossed and presented to Dr. Louis Ottofy, in view of the fact that he is about to take up his residence in Tokio, Japan.

On motion, the resolution was adopted.

The Secretary announced the appointment of Drs. T. L. Gilmer, J. W. Wassall and W. A. Hoover as Nominating Committee for members of the Executive Council.

It was moved by Dr. E. D. Swain that the discussion on Dr. York's paper be closed by the essayist.

Motion supported and carried.

Dr. C. S. Case read his paper, subject, "Some New Things in Orthodontia."

Moved by Dr. E. K. Blair that the discussion of Dr. Case's paper be postponed and that the lantern exhibit in connection with Dr. Hanaford's paper be presented.

Motion supported and carried.

Dr. M. L. Hanaford read his paper on "Preparation of Cavities," illustrated by lantern slides.

Dr. E. H. Allen moved that discussion on both Dr. Case's and Dr. Hanaford's papers be postponed till Thursday afternoon session.

Motion supported and carried.

On motion, the Society adjourned to meet Thursday 2, P. M.

THIRD DAY—THURSDAY MAY 12—AFTERNOON SESSION.

Called to order by the President at 2:30 o'clock.

Minutes of the previous session were read and approved.

The Secretary made the following announcements: The appointment by the Executive Council of the following committeemen and officers for the ensuing year: C. R. Taylor, Executive Committee; A. W. Harlan, Dental Science and Literature; J. E. Keefe, Dental Art and Invention. E. M. Robbins to succeed Dr. E. D. Swain as member of the Examining Committee; W. E. Holland, W. A. Hoover and P. J. Kester, Committee on Ethics; L. W. Skidmore, Supervisor of Clinics; A. H. Peck, Secretary; E. D. Swain, Treasurer; Geo. A. McMillen, Librarian. Chicago selected as place of next meeting. Garrett Newkirk, J. H. Prothero, H. J. Goslee, Local Committee of Arrangements.

The Executive Council recommended to the Society that the President, Secretary and Treasurer be empowered to pay to the State Board of Dental Examiners the sum $100, to assist in the prosecution of illegal practitioners, if in their judgment the necessity arises.

On motion, the recommendation was adopted.

The Nominating Committee recommended the election of Drs. J. Campbell, E. K. Blair and S. A. Campbell, as members of the Executive Council.

On motion, the recommendation was adopted, and they were declared elected.

Dr. W. E. Harper then opened the discussion on Dr. Hanaford's paper. The discussion was continued by Drs. G. V. Black and C. N. Johnson.

It was moved by Dr. E. H. Allen the subject be passed.

The motion was supported and carried.

On motion, Dr. J. N. Crouse was granted ten minutes in which to speak of the Protective Association.

On request of Dr. Crouse, a committee of five, consisting of Drs. Garrett Newkirk, E. D. Swain, E. C. Stone, S. F. Duncan and Edmund Noyes, was appointed by the chair to canvass the members of the Society to ascertain who are not members of the Protective Association.

Dr. H. J. Goslee then opened the discussion on Dr. Case's paper.

It was moved and carried the subject be passed, the essayist closing the discussion.

Dr. J. W. Cormany then read his paper, subject, "Where Shall I Locate, or the Beauties of a Country Practice."

Dr. C. N. Johnson opened the discussion, and it was continued by Dr. E. H. Allen.

On motion, the subject was passed, the essayist closing the discussion.

Dr. L. E. Custer, of Dayton, Ohio, read his paper, subject, "A New Process of Fusing Platinum."

Dr. W. V-B. Ames opened the discussion and it was continued by Mr. Lob.

Moved and carried the subject be passed, the essayist closing the discussion.

Dr. J. E. Nyman read his paper, subject, "Ceramic Art in Dentistry, with Some Original Methods and Experiments."

The discussion was opened by Dr. C. B. Rohland and continued by Dr. Geo. W. Schwartz.

It was moved and carried the Society adjourn to meet at 8 P. M.

Evening Session.

Was called to order by the President at 8:30 o'clock.

Dr. E. H. Allen moved the discussion on Dr. Nyman's paper be closed by the essayist.

Motion was supported.

Dr. Ames was granted a few minutes to discuss the subject.

Motion was carried.

Dr. Edmund Noyes presented the following recommendation from the Executive Council: That Dr. W. A. Johnston, of Peoria, be permitted to pay his dues for the year he was absent from the State and that he be granted the rights pertaining to a continuous membership from the time he originally joined the Society.

On motion, the recommendation was adopted.

The Secretary then read the report of Committee on Medals and Prizes.

REPORT.

To the President of Illinois State Dental Society.

Sir:—Your committee, appointed at the last meeting, on Medals and Prizes recommends the adoption of the following resolution:

Resolved, That the sum of two hundred dollars ($200) is hereby appropriated from the funds of the Society to Dr. G. V. Black to assist him in defraying the expenses for his scientific work.

Respectfully submitted,

J. W. Wassall,
A. H. Peck.

On motion, the resolution was adopted.

Dr. T. W. Brophy read his paper, subject, "Oral Surgery."

The discussion was opened by Dr. R. N. Lawrance, and was continued by Drs. T. L. Gilmer and J. E. Nyman.

On motion, the subject was passed, the essayist closing the discussion.

The President announced the appointment of Drs. J. G. Reid, J. W. Wassall, A. W. Harlan, R. N. Lawrance and O. M. Daymude as committee to prepare suitable resolutions, the same to be presented to Dr. Ottofy.

The Secretary read an invitation from the Missouri State Dental Society to attend their annual meeting to be held in Meramec Highlands, July 5-6-7-8.

Dr. A. H. Peck read his paper, subject, "The Essential Oils and Some Other Agents: Their Value as Antiseptics, also Their Irritating or Nonirritating Properties."

Dr. G. V. Black opened the discussion, which was continued by Drs. C. P. Pruyn, E. L. York, G. V. Black and A. H. Peck.

On motion, the discussion was continued, and the Society adjourned to meet at 8:30 A. M. Friday.

FOURTH DAY—FRIDAY, MAY 13—MORNING SESSION.

Was called to order by the President at 9 o'clock.

Minutes of the previous session were read and approved.

Discussion on Dr. Peck's paper was continued by Dr. Garrett Newkirk.

On motion, the essayist closed the discussion.

Dr. Garrett Newkirk read the report of the committee appointed to draft suitable resolutions, the same to be engrossed and presented to Dr. Geo. H. Cushing.

On motion, the report was adopted by a rising vote.

COPY OF LETTER ENGROSSED AND SENT TO DR. GEORGE HOPPIN CUSHING.

We, the members of the Illinois State Dental Society, in convention assembled at Springfield, desire to present this letter as an expression of our sincere affection and high esteem.

To the older among us you are as a brother tried and true, to the younger as a father, to all a faithful friend.

We regret deeply your removal from our State, and we greatly miss your presence at this meeting.

You took the first steps for the organization of this society, and you have been identified with every forward movement in its history. Every stage of our growth as a profession bears the mark of your guiding hand. It is not too much to say for the edifice of dentistry in the State of Illinois, that you have been our master builder.

It is remarkable as a fact, and a most worthy example of faithfulness, that during thirty-three years you have not missed a meeting of this Society, nor failed to be present at the opening and closing sessions.

There is no one of us not indebted to you personally for wise counsel and helpful advice. You have been especially the friend of the younger members of the profession, and the ever watchful guardian of their interests.

We appreciate your labors in behalf of education, which have been unremitting and of inestimable value.

We remember with grateful pride your efforts in behalf of dental legislation, and your efficient service on the first State Board of Examiners. We have appreciated your work in the broader field of the American Dental Association, and have felt ourselves honored in the honors so worthily bestowed upon you by that body.

In conclusion, we desire to commend you to whomsoever of the dental or medical profession you may meet in California, and to the fellowship of any association you may visit.

We extend our heartiest greetings and the assurance of our lifelong affection. May the Lord bless you with renewed health in the "land of sunshine," and fill your days with happy thoughts, and we hope to see you with us again in years to come.

This letter is adopted as the expression of the Society by a rising vote.

A. W. Harlan, A. M., M. D., D. D. S.
J. W. Wassall, M. D., D. D. S.
J. G. Reid, D. D. S.
[seal.] O. M. Daymude, D. D. S.
R. N. Lawrance, D. D. S.
} *Special Committee.*

Chas. P. Pruyn, M. D., D. D. S.
President.

A. H. Peck, M. D., D. D. S.
Secretary.

Dr. W. V-B. Ames' paper, subject, "Cataphoresis (Electrolysis)", was called for.

The doctor not being present, Dr. G. V. Black moved that the paper be read by title and pass into the transactions.

Motion supported and carried.

Dr. E. K. Blair then read his report as Supervisor of Clinics.

It was moved by Dr. Garrett Newkirk that the Society proceed to the election of President and Vice President.

The motion was supported and carried.

While the ballots were being prepared, Dr. J. G. Reid presented the report of the committee appointed to prepare resolutions, the same to be engrossed and presented to Dr. Louis Ottofy.

"Artem Doctrina Sanitatem Arte."

ILLINOIS STATE DENTAL SOCIETY.

ORGANIZED 1865.

To whom these presents shall come: GREETING—

This is to certify that at the thirty-fourth annual meeting of the Illinois State Dental Society held in the city of Springfield, Ill., from May 10 to May 13, 1898, the following resolution was unanimously adopted:

The members of this Society learn with regret that their friend and associate, Louis Ottofy, D. D. S., of Chicago, is about to depart for Japan to engage in the practice of dentistry, and to continue in scientific and educational labors in connection with dentistry, they therefore desire to express, in this manner, their appreciation of Dr. Ottofy, to bear testimonial of his worth as a useful and honorable member of this society and of the dental profession. Dr. Ottofy became a member of this society in 1881, and has since that time always been a member in good standing, and that he has attended since 1881, every meeting except one. He has held a number of offices at various times, among them the important office of secretary, which he has ably filled from 1891 to 1897, a period of six years, thus exceeding in length of service that of any predecessor. As a gentleman of more than ordinary ability and energy, and as one who is always in the ranks of the advance guard with those who work for the best interests of the profession, as one who has attained and has worthily filled numerous positions of trust and honor in the dental, literary, educational and social field of the profession, local, State and national, we, the members of this Society, cordially and heartily recommend him to the people and the profession of Japan, as worthy of their fullest confidence.

Given by the authority, and over the seal of the Society, signed by its officers, and the members of the special committee, in the city of Springfield, Ill., this thirteenth day of May, 1898.

[SEAL.]

A. W. HARLAN, A. M., M. D., D. D. S.
J. W. WASSALL, M. D., D. D. S.
J. G. REID, D. D. S.
O. M. DAYMUDE, D. D. S.
R. N. LAWRANCE, D. D. S.
} *Special Committee.*

CHAS. P. PRUYN, M. D., D. D. S. *President.*

A. H. PECK, M. D., D. D. S. *Secretary.*

On motion, the report was adopted.

The balloting resulted in the election of Dr. Chas. P. Pruyn, President, and Dr. A. S. Waltz, Vice President, for the ensuing year.

Dr. J. E. Keefe made a supplementary report on Art and Invention.

Dr. F. B. Noyes presented a report of test fillings of amalgam.

The President and Vice President elect were installed into their respective offices.

It was moved by Dr. McIntosh that a vote of appreciation be extended to Drs. Black and Noyes for the work done with amalgam.

The motion was supported and carried.

The President announced the appointment of Drs. Edmund Noyes and C. N. Johnson to act with the Secretary as members of the Publication Committee.

Dr. Louis Ottofy was granted privilege to speak on the death of Dr. H. S. Chase.

On motion, the Secretary was directed to incorporate the report of the Committee on Necrology in the minutes.

Remarks on the Death of Dr. Chase.

Dr. Louis Ottofy, Chicago: *Mr. President and Members of the Illinois State Dental Society:* I cannot let this opportunity pass without saying a few words regarding the demise of my teacher and friend, Dr. Henry S. Chase.

Dr. Chase was one of the first members of the profession whom it has been my pleasure to meet and my acquaintance with him extends over a period of twenty years. I have known him as a teacher and as a personal friend, as a man, in every regard above reproach, of a mild, kindly disposition, an unfaltering interest in the welfare of the profession. One whose many ideas were in advance of the times, and hence often commented and looked upon as eccentric or strange. One who persistently adhered to the principles he considered right, regardless of the impression they might make upon others.

I desire to express my high esteem of his worth as a man, dentist, and teacher and to add this meager tribute to his memory, coupled with sympathy to the sorrowing members of his family.

Minutes of the session read and approved.

On motion, the Society adjourned.

A. H. Peck,
Secretary.

1898.

MINUTES

OF THE

EXECUTIVE COUNCIL,

ILLINOIS STATE DENTAL SOCIETY.

TUESDAY, MAY 10, 1898.

Executive Council called to order by the President at 9 A. M.

The following communication from Dr. Ottofy was read :

CHICAGO, May 4, 1898.

TO THE EXECUTIVE COUNCIL OF THE ILLINOIS STATE DENTAL SOCIETY.

Mr. President and Gentlemen: I have attended to the preparation of the Transactions of 1897, and to the mailing and distribution of the same.

Finding that a large and uneven number of the Transactions of past years was on hand, and that when they are kept by the Secretary, the accumulation becomes cumbersome and unnecessary, I distributed copies of past years to the number of about 450, retaining for the Society a reasonable number of each year of which copies were on hand. These, with old papers and cuts, books, former records, stubs, etc., etc., are now packed in a box ready for shipment to such point as the Secretary may designate, it being my suggestion that at the meeting in Springfield arrangements be made with the custodian of the capitol, to permit them being shipped here. I have secured such permission from the then Secretary of State four years ago, but have failed to carry the plan into execution.

At the last meeting I collected $630 in dues. The Treasurer's receipts for the same are presented with the report of the Secretary. Since the meeting has closed, I have endeavored only to secure the Society from loss, by endeavoring to collect from those who have been so far in arrears as to not be members of the Society under the constitution. In this manner I have reduced the number who are unconstitutionally on the books of the Society, at the time they were turned over to Dr. Peck, to four, and I trust that the present Secretary may exert his persuasive powers to retain them on the roll.

At the time of the adjournment of the Society last May there was still due to the Society from members the sum of.....			$669.00
Of this sum I collected and paid to the Treasurer.....		$40.00	
Loss by dropping 6 member each owing $15.....		90.00	
Turned over to Dr. Peck for collection:			
From 4 members for 1895.....	$20 00		
From 23 members for 1896.....	115.00		
From 80 members for 1897.....	400.00		
From nonresident members.....	4.00	539.00	
		$669.00	$669.00

All of which is respectfully submitted.

LOUIS OTTOFY.

The Secretary read his annual report.

SECRETARY'S REPORT.

SPRINGFIELD, May 10, 1898.

Mr. President and Gentlemen:

Your Secretary presents the following annual report:

Total active membership at beginning of last meeting.....	178
New members elected during last meeting.....	45
Total at close of meeting.....	223
There have been lost by resignation,	
A. H. McCandless.....	1
By death:	
None.	
Leaving the present active membership.....	222
The number of nonresident members is.....	5
The number of corresponding members was increased by the election of Dr. J. H. Kennerly from 27 to.....	28
The number of honorary members is decreased by the death of Dr. H. S. Chase from 13 to.....	12
Leaving the total active, nonresident, corresponding and honorary members at.....	267

The following is a list of moneys received since the last annual report:

Dues received at last meeting by the late Secretary.....	$630 00
Dues received since last meeting by the late Secretary.....	40 00
Dues received by myself since the last meeting.....	125 00
One copy of Transactions.....	1 00
Total.....	$796 00

For all of which the Treasurer's receipts are herewith submitted.

Respectfully submitted,

A. H. PECK, Secretary.

The President appointed Drs. A. S. Waltz, L. W. Skidmore and Edmund Noyes as Auditing Committee.

On motion, the Secretary's report was referred to the Auditing Committee.

By request of the Treasurer his report was deferred till the afternoon session.

The Secretary read the report of the Publication Committee.

REPORT OF THE PUBLICATION COMMITTEE, 1898.

Mr President and Gentlemen:

Your committee authorized the DENTAL REVIEW (H. D. Justi & Son, publishers) to publish such portions as they desired, in the DENTAL REVIEW, and in consideration therefor H. D. Justi & Son paid the expenses of printing for a consideration of $150.

The volume for 1897 appeared about January, 1898. There are about fifty cloth bound and sixty paper covered copies on hand, after the usual distribution to members, colleges, dental societies, libraries, etc. Cost of postage, delivery, etc., is included in the accounts of the late Secretary.

Respectfully submitted,

A. H. PECK, Chairman.

On motion, it was referred to the Auditing Committee.

The Librarian, Dr. Grafton Munroe presented no report.

It was moved by Dr. Edmund Noyes the President appoint a committee on necrology from members outside the Executive Council.

Motion was supported and carried.

It was moved by Dr. E. D. Swain that the President and Secretary be authorized to grant certificates to members wishing to attend the National Association.

Motion supported and carried.

On motion the Council adjourned to meet at 2 P. M.

AFTERNOON SESSION.

The Council was called to order by the President at 2 o'clock.

The minutes of the previous meeting were read and approved.

Dr. E. D. Swain, Chairman of the Committee on Membership, read the following names as applicants for membership and recommended that they be elected: E. F. Hazell, Springfield; J. B. Dicus, Chicago; N. D. Edmonds, Chicago; R. H. Kimball, Chicago, and R. G. Hunn, Springfield.

On motion, they were declared elected to membership in the Society.

Dr. Swain then read his annual report as Treasurer of the Society.

As Treasurer of the Illinois State Dental Society I have the honor to report as follows:

1897.		
May 10;	On hand last report	$225.97
May 12,	Received from Secretary Ottofy	430.00
May 13,	" " " "	100.00
May 17,	" " " "	100.00
1898.		
Mar. 16,	" " " Peck	71.00
Apr. 7,	" " " "	15.00
May 9,	" " " "	40.00
May 10,	" " " "	55.00
		$1,036.97

EXPENDED.

As per vouchers, A to K		$735.78
Cash on hand		301.19
	$1,036.97	$1,036.97

Respectfully submitted.

EDGAR D. SWAIN, Treasurer.

On motion the report was referred to the Auditing Committee.

Dr. J. G. Reid moved that the usual vote of thanks be extended to the S. S. White Co. for printing and distributing programs.

The motion was supported and carried.

Dr. E. D. Swain moved that the usual vote of thanks be extended to the railroads and hotels for the customary reduction in rates.

Motion supported and carried.

Dr. Edmund Noyes moved that the next President elect be appointed to deliver the annual address of the Society.

Motion supported and carried.

It was moved and carried that the Council adjourn to meet at the close of the afternoon session.

Tuesday afternoon, no meeting at the close of the afternoon session.

WEDNESDAY, MAY 11.—AFTERNOON SESSION.

Council called to order by the President at 2 o'clock.

Minutes of the previous meeting were read and approved.

The President appointed Drs. G. V. Black, G. A. McMillen and T. W. Pritchett as Committee on Necrology.

Dr. Swain read the following names as candidates for election to membership, and recommenced they be elected: W. W. Schermerhorn, Jacksonville; J. S. Bridges, Chicago; I. B. Johnson, Onarga; G. A. Miller, Chicago; A. M. Markle, Chicago; P. A. Pyper, Pontiac; J. H. Smyser, Chicago, and A. P. Condon, Springfield.

On motion, they were declared elected.

On motion, the Council adjourned to meet at 7:45 P. M.

Evening session called to order by the President at 7:45 o'clock.

Minutes of the previous meeting were read and approved.

The President appointed Drs. T. L. Gilmer, J. W. Wassall and W. A. Hoover as Nominating Committee for members of the Council.

The Auditing Committee reported the accounts of the Secretary and Treasurer to be correct.

On motion, the report of the Auditing Committee was adopted.

Dr. Swain reported favorably on the following applications for membership: D. A. Hare, Chicago, G. W. Schwartz, Chicago, Robert Good, Chicago, J. D. Ried, Pana, H. B. Farmer, E. St. Louis, W. J. Morrow, Bushnell, C. F. Smith, Chicago, Jennie S. Spurrier, Springfield, F. A. Lane, Macomb, A. B. Carey, Jr., Pittsfield, J. D. Nicol, Peoria, O. S. Bandy, Lasalle, C. N. Reese, Chicago, and M. R. Harned, Rockford.

On motion, they were declared elected.

Dr. E. H. Allen presented a bill for $6.61, sundry expenses as Executive Committee.

On motion, the bill was ordered paid.

On motion, the Council adjourned to meet at 1:30 P. M., Thursday.

THURSDAY, MAY 12, AFTERNOON SESSION.

Was called to order by the President at 1:30 o'clock.

Minutes of the previous meeting were read and approved.

Dr. Edmund Noyes presented a resolution to the effect that the President, Secretary and Treasurer be authorized, according to their discretion, to pay to the State Board one hundred dollars to assist in defraying the expenses in prosecuting illegal practitioners.

On motion, the resolution was ordered read to the Society, with recommendation for adoption.

On motion, the following were declared elected to fill the various committees and offices of the Society during the ensuing year: C. R. Taylor, Executive Committee; A. W. Harlan, Dental Science and Literature; J. E. Keefe, Dental Art and Invention; E. M. Robbins

to succeed E. D. Swain as member of Examining Board; W. E. Holland, W. A. Hoover and P. J. Kester, Committee on Ethics; L. W. Skidmore, Supervisor of Clinics, and F. B. Noyes and E. R. Carpenter, Assistants; A. H. Peck, Secretary; E. D. Swain, Treasurer; G. A. McMillen, Librarian.

Chicago was selected as the next place of meeting.

Garrett Newkirk, J. H. Prothero and H. J. Goslee, Local Committee of Arrangements.

On motion, the salary of the Secretary, $100, was ordered paid.

Dr. E. H. Allen presented his resignation as a member of the Council.

On motion, the Council declined to accept it.

On motion, the Council adjourned to meet at 7:45 P. M.

EVENING SESSION.

Called to order by the President at 8 o'clock.

Minutes of the previous meeting were read and approved.

The Committee on Medals and Prizes read their report.

On motion, the report was referred to the Society for adoption.

Dr. Swain recommended for election the name of A. I. Newcomer.

On motion, he was declared elected to membership in the Society.

On motion, the Council adjourned to meet at 7:45 A. M., Friday.

Friday morning at 9 o'clock, there being no quorum present and no business to transact, Dr. A. S. Waltz moved the Council adjourn *sine die*.

The motion was supported and carried.

A. H. PECK,
Secretary.

The Illinois State Dental Society, in Annual Convention assembled, pauses in its deliberation to pay a merited tribute of respect to the memory of those who, during the past year, have been taken from its rolls and transferred to the throngs of the Great Beyond.

OBITUARY.

H. S. Chase.

Born March 6, 1820. Died January 11, 1898.

Dr. Henry S. Chase was born near Bellows Falls, Vermont, March 6, 1820, and began the practice of dentistry about 1843, at Woodstock in that State. He resided there until 1856, when he moved to the State of Iowa and there practiced until 1867, when he moved to St. Louis, where the remaining years of his life were passed.

During the period when the "new departure" doctrines occupied so much attention in our journalistic literature, Dr. Chase's pen was exceedingly vigorous in support of the six articles known by the above title. Through his incisive and satirical style he became widely known to the profession throughout the country. He continued in practice until near the close of his life, which event occurred January 11, 1898, leaving his widow, four sons and a daughter surviving. He was elected to honorary membership in the Illinois State Dental Society 1869.

G. V. Black,
G. A. McMillen, } *Committee.*
T. W. Pritchett.

H. L. Hunter.

Born November 21, 1858. Died April, 1898.

Dr. Henry Louis Hunter was born at Clinton, Ill., November 21, 1858, and grew to manhood in that city. He was one of that city's most highly esteemed young men, being a member of several social organizations and the church in that place. He was a graduate of Philadelphia Dental College—class 1889.

He practiced for a short time at Streator and Leroy, and finally located at the place of his birth, where he was married to Miss Mattie B. Rucker, June 6, 1889, and who still survives him.

About January 1, Dr. Hunter took a severe cold, which resulted in enlargement of the glands of the neck.

He finally went to Chicago and consulted Drs. Nicholas Senn and A. J. Ochsner, who diagnosed pseudo-leukemia and advised an operation. This was postponed until near the last of April, when he again went to Chicago accompanied by his wife, where he underwent an operation. But alas! without success. For a time his friends had hope, but in a day or two our friend and co-worker was "called to the other side."

In 1892 he became a member of the Illinois State Dental Society, and although he had not yet become conspicuous in its proceedings, yet he was observed to be always a close observer and listener of those who were.

Dr. Hunter was of that age of oncoming young men who are soon to carry the profession to higher ideals of development, and had he lived, we doubt not he would have been in the forefront of progress.

G. V. Black,
G. A. McMillen, } *Committee.*
T. W. Pritchett.

IN MEMORIAM.

Austin, J. F.
Baker, D. B.
Bushong, E. W.
Call, E. B.
Chase, H. S.
Davis, E. F.
Dean, M. S.
Eames, W. H.
Fisher, J. W.
Fitch, H. H.
Forbes, Isaiah.
George, Isaac.
Hand, M. F.
Harrington, G. H.
Hawxhurst, D. C.
Hendel, D. W.
Henry, Charles.
Hilton, John.
Hunter, Henry Louis.
Ingersoll, L. C.
Judd, Homer.
Keely, George W.
Kulp, W. O.
Lewis, C. W.
Lewis, H. N.
Magitot, E.
Morrison, A. M.
Morrison, W. N.
Park, Edgar.
Patrick, J. J. R.
Reed, Thos. W.
Reynolds, J. S.
Rivers, C. W.
Sawyer, Charles K.
Sillimann, H. H.
Smith, H. J.
Spalding, C. W.
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Swasey, J. A.
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Verbeck, S. H.
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